

**ORIGINAL ARTICLE****Evaluation of elevated serum uric acid levels in the first trimester as a potential indicator of gestational diabetic mellitus**<sup>1</sup>Shikha Joshi, <sup>2</sup>Israr Ahmad<sup>1</sup>Associate Professor, Department of Obs & Gynae, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India;<sup>2</sup>Associate Professor, Department of Pathology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India**ABSTRACT:**

**Background:** One of the most significant pregnancy problems, gestational diabetes mellitus is linked to the morbidity and mortality of both the mother and the fetus. This study assessed increased first-trimester serum uric acid as a predictor of gestational diabetes mellitus. **Materials & Methods:** 62 females in firsttrimester were selected. A 5-milliliter venous blood sample was obtained from pregnant women who were fewer than 12 weeks along in their gestation. After one and two hours of fasting, the venous sample was quantified and evaluated for GDM according to ADA guidelines. **Results:** The age group 20-25 years had 11, 26- 30 years had 29, 31-35 years had 14, 36-40 years had 6 and 41-45 years had 2 patients. The difference was significant ( $P < 0.05$ ). Parity found to be primi in 36 and multi in 26. GTT was normal in 57 and positive in 5. Serum uric acid was elevated in 12 and normal in 50 cases. The difference was significant ( $P < 0.05$ ). **Conclusion:** Elevated levels of blood uric acid during the first trimester were associated with an increased risk of gestational diabetes mellitus (GDM).

**Keywords:** Antenatal women, Firsttrimester, Serum uric acid**Corresponding author:** Israr Ahmad, Associate Professor, Department of Pathology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India**This article may be cited as:** Joshi S, Ahmad I. Evaluation of elevated serum uric acid levels in the first trimester as a potential indicator of gestational diabetic mellitus. *J Adv Med Dent Scie Res* 2016;4(6):474-476.**INTRODUCTION**

One of the most significant pregnancy problems, gestational diabetes mellitus is linked to the morbidity and mortality of both the mother and the fetus.<sup>1</sup> GDM is described as "any degree of glucose intolerance with onset or first recognition during pregnancy" by the American Diabetes Association and the World Health Organization. The percentage of pregnancies with this condition varies from 1 to 14%. However, investigations carried out across the nation indicate that 16.55% of Indians have GDM on average.<sup>2</sup> Since GDM is most common in Indian women, it is necessary to diagnose the condition early using glucose tolerance tests between 24 and 28 weeks of gestational age. However, other research indicates that 40 to 66% of GDM-affected women can be diagnosed even earlier in pregnancy.<sup>3</sup>

Serum uric acid levels typically range from 2 to 6.5 mg/dl. Because of the elevated GFR in the early stages of pregnancy, serum uric acid is lowered. The enzyme xanthine oxidase creates a byproduct of purine metabolism, uric acid.<sup>4</sup> The placenta's hypoxia and ischemia, together with cytokines like interferon, cause xanthine oxidase to be expressed, which raises the creation of reactive oxygen species and uric acid.

Because serum uric acid is associated with obesity, hypertension, hyperinsulinemia, and dyslipidemia, it may be one of the components of the metabolic syndrome.<sup>5</sup> This study assessed increased first-trimester serum uric acid as a predictor of gestational diabetes mellitus.

**MATERIALS & METHODS**

The present study comprised of 62 females in firsttrimester. Approval from the ethical review committee was obtained. Patients' consent was obtained before starting the study.

Data such as name, age, etc. was recorded. A 5-milliliter venous blood sample was obtained from pregnant women who were fewer than 12 weeks along in their gestation. A colorimetric technique was used to quantify the serum uric acid after the samples were centrifuged. Blood was drawn while fasting for eight to ten hours during the night. After one and two hours of fasting, the venous sample was quantified and evaluated for GDM according to ADA guidelines. The results were compiled and subjected to statistical analysis. P value less than 0.05 was considered as significant.

**RESULTS**

**Table I Patients distribution**

Age group (years)	Number	P value
20-25	11	0.05
26-30	29	
31-35	14	
36-40	6	
41-45	2	

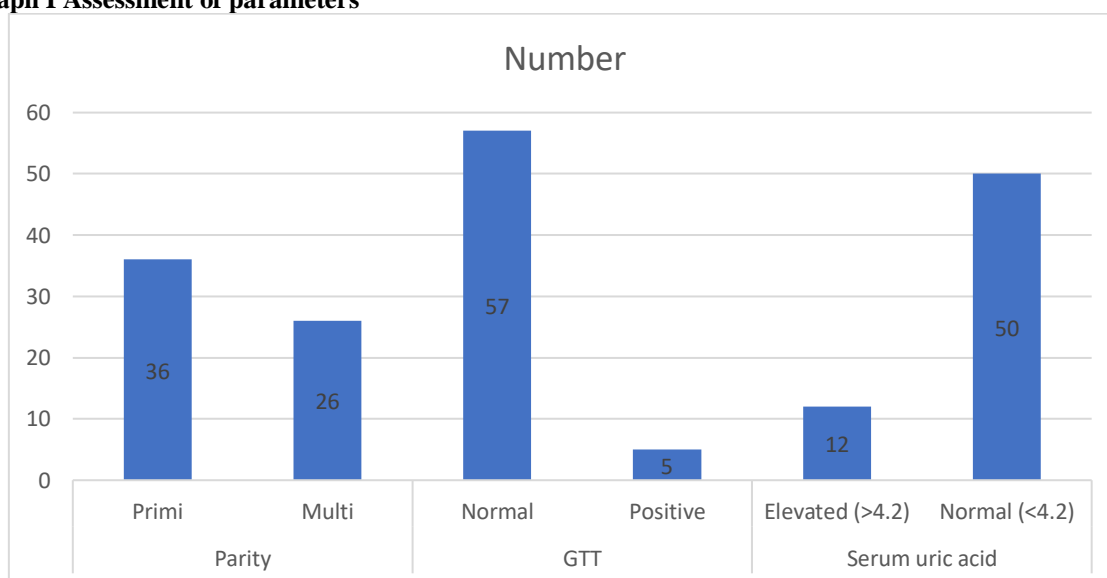
Table I shows that the age group 20-25 years had 11, 26- 30 years had 29, 31-35 years had 14, 36-40 years had 6 and 41-45 years had 2 patients. The difference was significant (P< 0.05).

**Table II Assessment of parameters**

Parameters	Variables	Number	P value
Parity	Primi	36	0.05
	Multi	26	
GTT	Normal	57	0.01
	Positive	5	
Serum uric acid	Elevated (>4.2)	12	0.01
	Normal (<4.2)	50	

Table II, graph I show that parity found to be primi in 36 and multi in 26. GTT was normal in 57 and positive in 5. Serum uric acid was elevated in 12 and normal in 50 cases. The difference was significant (P< 0.05).

**Graph I Assessment of parameters**



**DISCUSSION**

Insulin resistance is linked to serum uric acid in women who are not pregnant. It has been demonstrated that in pregnant women with hypertensive diseases, elevated uric acid levels are associated with insulin resistance. Additionally, compared to women without gestational diabetes mellitus, women with GDM had higher uric acid levels at 24 to 28 weeks of gestation.<sup>6</sup> Due to an increase in glomerular filtration rate and a decrease in uric acid reabsorption from the renal tubules, serum uric acid levels often drop dramatically from the eighth week of gestation to the twenty-fourth week of pregnancy. It probably represents preconception uric acid levels in the first trimester, and high levels may indicate women who are more susceptible to develop metabolic syndrome and GDM.<sup>7</sup>This study

assessed increased first-trimester serum uric acid as a predictor of gestational diabetes mellitus.

We found that the age group 20-25 years had 11, 26-30 years had 29, 31-35 years had 14, 36-40 years had 6 and 41-45 years had 2 patients. The association between uric acid levels in the first trimester and the chance of developing gestational diabetes mellitus (GDM) was examined by Katherine S Laughon et al.<sup>9</sup> Three hundred pregnant women up to fourteen weeks along in their pregnancy were enrolled. 2.66% (8/300) of the pregnancies were complicated by GDM. Five of the women (n=6) with serum uric acid levels > 5 mg/dl experienced abnormal blood sugar screening, and five of them went on to develop GDM.

We observed that parity found to be primi in 36 and multi in 26. GTT was normal in 57 and positive in 5. Serum uric acid was elevated in 12 and normal in 50

cases. Zhou J et al<sup>10</sup>, showed in their study, measured lipids and uric acid concentrations in 1000 healthy nulliparous women at 20 weeks of gestation and showed that hyperuricemic women experienced a 1.99-fold risk for preeclampsia and a 2.34-fold risk for GDM

Retnakaran R et al<sup>11</sup> found that there were no significant differences between the two groups in ethnicity, pre-pregnancy BMI, the insulin-sensitizing protein adiponectin, glucose tolerance status and area-under-the-glucose-curve (AUC(gluc)). In women with FHD, a multiple linear regression model of established GDM risk factors reconciled 35% of the variance in AUC(gluc), with (i) previous GDM identified as a positive independent determinant and (ii) log adiponectin and, unexpectedly, parity emerging as negative independent covariates of AUC(gluc). In contrast, in women without FHD, the same multivariate model reconciled only 15% of the variance in AUC(gluc), with no significant variables identified. Interestingly, in the entire population (n = 173), parity significantly modified the relationship between FHD and AUC(gluc) (FHD-parity interaction:  $t = -2.29$ ,  $P = 0.0235$ ). Indeed, FHD was an independent determinant of AUC(gluc) in nulliparous women (n = 91), but not in parous women (n = 82).

Weisz et al<sup>12</sup> assessed a possible correlation between insulin resistance and uric acid levels in gestational hypertension (GH) and preeclampsia. Fourteen pregnant, nondiabetic women with either GH (n = 7) or preeclampsia (n = 7) and nine pregnant healthy controls in the third trimester were enrolled onto the study. Fasting serum was collected and insulin sensitivity was determined by Homeostasis Model Assessment based on the algorithm developed by Turner and colleagues. Serum samples were also analyzed for creatinine and uric acid levels. Insulin resistance and uric acid levels were compared between hypertensive and control pregnant women, and the association between these two variables was calculated. There were no significant differences in mean age, weight, body mass index, and glucose challenge test between all hypertensive patients and controls. Significant differences were revealed in insulin sensitivity between hypertensive and nonhypertensive pregnant women (45 +/- 31.2% vs. 79.7 +/- 33%;  $p = 0.018$ ). In our study, uric acid levels were not significantly higher for hypertensive patients (5.46 +/- 0.85 vs. 4.53 +/- 1.4 mg/dL in controls;  $p =$

0.06). The elevated serum uric acid levels were highly correlated to insulin resistance in patients with GH.

## CONCLUSION

Authors found that elevated levels of blood uric acid during the first trimester were associated with an increased risk of gestational diabetes mellitus (GDM).

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