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## Research Article

# INCREASED FIRST TRIMESTER SERUM URIC ACID AS A PREDICTOR OF GESTATIONAL DIABETES MELLITUS

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### ABSTRACT

**Introduction-** Gestational diabetes mellitus is a common complication in pregnancy, affecting more than 10% pregnancies worldwide. However, the true underlying causes remain to be fully elucidated. **Aims & Objective-**The study aims at testing the hypothesis that elevated uric acid in first trimester of pregnancy associated with subsequent development of gestational diabetes. **Material & Methods-**This prospective observational study was conducted in the Department of Obstetrics and Gynaecology in Rama Medical College Hospital & Research Centre, KANPUR from November 2022 to October 2023. Total 50 pregnant women less than 12 weeks were included in this study after informed consent. Blood samples were collected for serum uric acid analysis and all these patients were followed up with oral glucose tolerance test 24-28 weeks of gestation. **Result-**Mean age of pregnant women was 27.7±5.1 years. The mean height and weight was 160±2.9cms and 58.9±3.2kg respectively. The body mass index of patients was 22.9±1.4 kg/m<sup>2</sup>. The mean gestational age of the pregnant women was 10.34±1.4 weeks. The mean uric acid was 3.2±1.4mg/dl. In this study the p value was 0.026 using chi-square test which was significant. **Conclusion-**There was increased risk of development of GDM with increased levels of serum uric acid in the first trimester.

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## INTRODUCTION

GDM is defined as glucose intolerance that was not present or recognized prior pregnancy and it is diagnosed when the pancreatic function in women is not sufficient to control the Diabetogenic environment that pregnancy confers (1). The prevalence may range from 1-14% of all pregnancies depending on the population studied and the diagnostic test employed (2) It is well recognized that GDM and also milder degree of carbohydrate intolerance are associated with increased perinatal complications and adverse pregnancy outcomes (3). Several studies have now shown that, women who go on to develop GDM later in pregnancy have biochemical abnormalities that can be detected in the first trimester including increased level of uric acid (4,5).

Uric acid, the final oxidation product of purine metabolism, is associated with insulin resistance (6-7). Uric acid could also play a role in glucose homeostasis by increasing insulin resistance, by inhibiting insulin mediated endothelial nitric oxide release and by directly acting on adipocyte (8-12). A large body of evidence supports the fact that uric acid could be an important risk factor for development of Type 2 Diabetes,

especially in women (13-15). 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 factors of metabolic syndrome (16).

## MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Obstetrics and Gynecology in Rama Medical College & Research Centre from November 2022 to October 2023 on 50 pregnant women in first trimester and consented to participate in the study. A woman with history of hypertension, liver disease, renal disease, gout etc. was excluded. Demographic data related to each patient was recorded. Venous blood sample was taken from all patients. The samples were centrifuged and serum uric acid is measured by colorimetric assay with detection limit of 0.2-20 mg/dl and patients were followed up at 24-28 weeks to do oral glucose tolerance test. After overnight fasting of 8-10 hours, blood sugar in the fasting state was collected. 75 grams oral glucose was given dissolved

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in plain or lime water to improve patient compliance. Venous sample is measured after fasting, one hour and two hours and assessed for GDM using IADPSG-ADA criteria.

**Inclusion criteria:** All non-diabetic antenatal women in their first trimester of pregnancy less than 12 weeks of gestation.

**Exclusion criteria:** hypertension, renal disease, liver disease, gout, smoking and alcohol intake, drugs known to cause increased serum uric acid levels e.g. aspirin, phenothiazine, diuretics

**RESULT**

No. of cases were of age group between 20-40years. Mean age of cases in this study was 27.7±5.1 years (Table-1). Distribution of cases according to parity (Table-2). Distribution of cases according to serum uric acid level. Mean serum uric acid of the participant was 3.2±1.5Table - 3.Distributon of cases according to GTT result Table - 4.

**Table.1** Distribution of cases according to age

Age (years)	No. of cases	Percentage
20-25	15	30%
26-30	22	44%
31-35	8	16%
36-40	5	10%

**Table.2** Distribution of cases according to parity

Parity	No. of cases	Percentage
PrimiGravida	19	38%
MultiGravida	31	62%

**Table.3** Distribution of cases according to serum uric acid level

Serum uric acid category	Frequency	Percentage
Normal <4.2	32	64%
Elevated>4.2	18	36%
Total	50	100%

**Table.4** GTT Result

GTT result	Frequency	Percentage
Positive	13	26%
Negative	37	74%
Total	50	100%

**CONCLUSION**

SuricAcid Group * GTT result Cross tabulation				
		GTTresult		Total
		-ve	+ve	
Suric Acid Group	Normal	27	5	32
		84.4%	15.6%	100.0%
	Elevated	10	8	18
		55.6%	44.4%	100.0%
Total		37	13	50
		74.0%	26.0%	100.0%
<b>X<sup>2</sup>=4.97, p=.026</b>				

Several risk factor have been implicated in the development of GDM. These are similar to the factors associated with overt diabetes and included increased maternal age, obesity, ethnic background, family history of GDM (17)..In addition, other risk factors include previous history of a macrosomic baby, previous adverse pregnancy outcome, glycosuria, polyhydraminos or large foetus in present pregnancy (18).

Among these risk factors, increased maternal weight is the most commonly evaluated reversible risk factor.

Wang *et al.* (19) showed that an independent significant relationship between reduced intake of polyunsaturated fat and development of GDM.

The present study was conducted to assess the role of serum uric acid as a predictor of Gestational diabetes mellitus. 30% of cases are of age group between 20-25 years, 44% of cases are of age group between 26-30 years, 16% of cases are of age group between 31-35 years, 10% of cases are of age group between 36-40, Mean age of cases in this study is 27.7±5.1yrs. 38% of cases in this study are Primigravida. 62% of cases in this study are Multigravida. Serum uric acid was elevated(>4.2) in 18 and normal (<4.2) in 32.Sivasarpura *et al* (20). Assessed if elevated uric acid in first trimester of pregnancy is associated with subsequent development of gestational diabetes.

All pregnant women less than 12 weeks were included. Blood samples were collected for serum uric acid analysis and all these patients were followed up with oral glucose tolerance test at 24-28 weeks of gestation. In this study, according to IADPSG-ADA criteria to interpret the OGTT values, any two of the values with fasting ≥ 95mg%, one hour ≥180mg% and two hour ≥ 180mg% were considered positive for GTT. According to above criteria, GTT result was negative in 37 and positive in 18 patients.Mean age of pregnant women was 27.7±5.1 years. The mean height and weight was 160±2.9cms and 58.9±3.2kg respectively. The body mass index of patients was 22.9±1.4 kg/m2. The mean gestational age of the pregnant women was 10.34±1.4 weeks. The mean uric acid was 3.2±1.4mg/dl. We found that among 10 elevated uric acid patients, 8 had positive GTT results and among 27 normal serum uric acid patients, 5 had positive GTT result. Aker *et al.*(21) investigated the association of first trimester serum uric acid levels with the development of gestational diabetes mellitus GDM in low risk pregnant women. In our study, serum uric acid cut off of 4.2 mg/dl has a positive association with the GTT values with p-values less than 0.05 (p=0.026). This was identical to the research by Laughon SK *et al.* where a UA cut off of 3.6 mg/dl had a positive interrelation with GDM.

**Limitations**

The sample size was small and there was only a single observer, there was a chance for an observer bias (inter observer variability), an instrumental bias etc.

**CONCLUSION**

Based on the results found, we have concluded that there is higher risk of development of GDM with increased levels of serum uric acid estimated in the first trimester.

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