Original Research Paper Education

Role of Uric Acid as a Predictor in the Diagnosis of Gestational Diabetes Mellitus

Dr. H. Anitha Virgin Kumari | MD DGOGovt .RSRM Lying in hospital, Stanley medical college Royapuram , Chennai -13,Tamilnadu

Dr. V. Rajalakshmi | MD DGOGovt RSRM lying in hospital, Stanley medical college, Royapuram, Chennai-13, Tamilnadu

ABSTRACT

Gestational diabetes mellitus is defined as carbohydrate intolerance of variable severity with onset or first recognition during present pregnancy. Uric acid is an independent risk factor for developing type 2 diabetes mellitus. This study provides an effective screening test thereby an idea to implement as measures of prevention. This is a prospective study ,including 154 antenatal women belonging to I trimester having regular antenatal visit in GOVT RSRM LYING-IN HOSPITAL from June 2015 to June 2016. Venous blood sample were tested for serum uric acid using calorimetric assay with detection limit of 10mg/dl and the coefficient was 0.9%. These antenatal mothers were followed up around 24-28 weeks for routine Gestational diabetes mellitus screening. Among those antenatal women with positive Glucose Challenge test are subjected to oral glucose tolerance test. Patients are considered to have Gestational diabetes mellitus if two or more of the values exceed the following

Diagnostic criteria – Carpenter& Coustan (plasma) mg/dl

Fasting -95mg/dl

1hr-180mg/dl

2hr-155mg/dl

3hr-140mg/dl

In our study patients with elevated uric acid were highly positive for GTT. Hence the FIRST TRIMESTER SERUM URIC ACID can be used as screening test for the prediction of GDM.

KEYWORDS | Gestational diabetes mellitus, Serum uric acid, Glucose challenge test

INTRODUCTION

Gestational diabetes mellitus is defined as carbohydrate intolerance of variable severity with onset or first recognition during present pregnancy. Uric acid is associated with insulin resistance in non pregnant women. Uric acid is an independent risk factor for developing type 2 diabetes mellitus within 10 years in non pregnant adults ,an association that was stronger in women compared to men .In pregnancy uric acid is correlated with insulin resistance in women with gestational hypertension and higher at 24-28 weeks of gestation in women diagnosed with GDM compared to women without diabetes .Uric acid is also higher in non pregnant women with history of geststional diabetes , independent of body mass index. Since uric acid is associated with insulin resistance and predates development of type 2 diabetes in non pregnant women we hypothesis that higher uric acid in the first trimester would be associated with development of gestational diabetes. Compared with Pre-pregnancy values of uric acid concentrations decreased significantly by 8 weeks gestation and this reduced level maintained until about 24 weeks.

AIM OF THE STUDY

The aim of the study is to test the hypothesis that elevated uric acid measured in the first trimester of pregnancy is associated with the subsequent development of gestational diabetes mellitus

MATERIALS AND METHODS

This is a prospective study conducted in government RSRM – lying in hospital attached to Stanley medical college during June 2015-2016. A total of 154 antenatal women belonging to first trimester were included in the study .

INCLUSION CRITERIA

Antenatal women with gestational age <15 weeks

EXCLUSION CRITERIA

Pregestational diabetes mellitus
Renal disease
Liver disease
Cardiovascular disease
Gout
Smoking

MEASUREMENT OF PLASMA URIC ACID

Venous blood sample was withdrawn from antenatal women with gestational age < 15 weeks. The samples were centrifuged to separate the serum and stored at -70 degree C till examined .Uric acid measured using colorimetric assay with detection limit of 10 mg/dl. The coefficient was 0.9%.

ORAL GLUCOSE TOLERANCE TEST

All antenatal mothers were followed up around 24-28 weeks for routine GDM screening with 50 grams of oral glucose challenge test .Those antenatal mothers with plasma glucose level after 1hour >140 mg/dl are considered high risk and are subjected to oral glucose tolerance test.

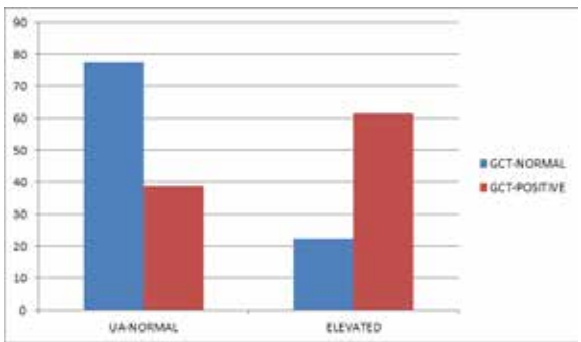
After about 8hrs of fasting ,those antenatal women with positive GCT are subjected to GTT . Fasting blood glucose is taken .After which 100 grams of glucose is taken oral. 1hr, 2hr ,3hr glucose levels are measured. Patients are considered to have GDM if two or more of the values exceed the following:

Diagnostic criteria- Carpenter& Coustan (plasma) mg/dl
Fasting- 95mg/dl
1hr-180mg/dl
2hr-155mg/dl
3hr-140mg/dl

RESULTS

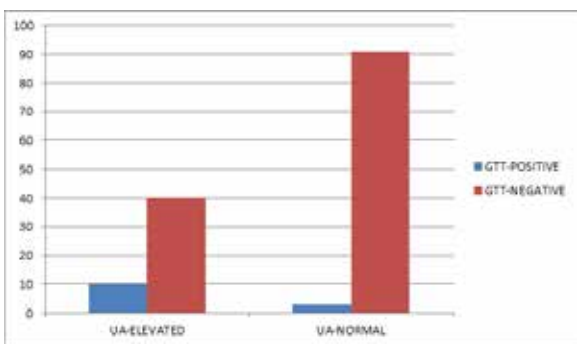
RELATIONSHIP BETWEEN SERUM URIC ACID AND GCT:

In our study of total patients (60) with elevated uric acid , 20 patients had normal GCT – constituting 22.5%. And the remaining 40 patients with elevated uric acid had positive GCT constituting 61.5%. And among those with normal uric acid total (94), 69 Patients had normal GCT constituting 77.5% and 25 patients was positive for GCT with 38.5%



RELATIONSHIP BETWEEN SERUM URIC ACID AND GTT

In our study among the 60 patients with elevated uric acid,10 patients were positive for GTT. And the remaining 40 were negative for GTT. And among the 94 patients with normal uric acid only 3 were GTT positive



RELIABLITY OF THE TEST IN PREDICTING GDM

Sensitivity	specificity	Positive likelihood ratio	Negative likelihood ratio	Diagnostic ratio
76.9	64.5	2.678	0.383	6.991

RISK OF GESTATIONAL DIABETES BY FIRST TRIMESTER URIC ACID QUARTILE

	GDM	Adjusted OR*-95%CI
1st (2.1)	7(0.5)	Ref
2nd(2.7)	12(0.8)	1.62(0.63-4.22)
3rd(3.2)	20(1.3)	2.35(0.96-5.78)
4th(4.2)	34(2.2)	3.95(1.35-7.83)

First trimester uric acid concentrations >= 3.6 mg/dl, (highest quartile) were associated with a trend towards increased risk of developing gestational diabetes (adjusted OR =3.91;95%CI :0.75,1.96) compared to women with concentrations below this concentration (lower three quartiles) ,after adjusting for BMI. Using a cut point of 3.6 mg/dl yield a positive predictive value (PPV) of 12.0% and negative predictive value (NPV) of 97.7% for the development of GDM.

CONCLUSION

The objective of implementing an antenatal screening test for GDM is to identify pre –symptomatic women who will subsequently develop complications of pregnancy and implement efficacious treatment to reduce morbidity and mortality . Currently complications of pregnancy due to GDM are not diagnosed until mid-late gestation.

It is important to recognise that by the time GDM is diagnosed in the late second or early third trimester of pregnancy , the pathology is probably established and that reversal of the potential adverse perinatal outcomes may be limited. Many health professionals advocate the need for an earlier diagnostic/predictive test for GDM , one among them is " THE FIRST TRIMESTER SERUM URIC ACID"

A pregnant women with high risk factors as marked obesity ,strong family history of type II DM ,previous history of GDM , impaired glucose metabolism or glucosuria , history of neonatal death ,history of fetal macrosomia , along with >4.2 mg/dl is at risk of developing GDM .

The use of FIRST TRIMESTER SERUM URIC ACID as a predictor of GDM is simple, inexpensive, non invasive and easy to perform. This can be used as screening test for the prediction of GDM

REFERENCES

1. Modan M,Halkin H, Karasik A. Elevate uric acid -a facet of hyperuricemia .Diabetologia 1987:30:713-8
2. Dehghan A ,Van Hoek M,Sijbrands EJ A, high uric acid asa noval risk factor for type 2 diabetes . Diabetes care 2008;31:361-2
3. Weisz B,Cohen O,Homko CJ, Schiff E,Sivan E . Elevatedserum uric acid levels in gestatinal hypertension are correlated with insulin resistance
4. Yoo TW,Sung KC,Shin HS . Relationship between serum uric acid concentration and insulin resistance and metabolic syndrome
5. HERMAN,J.B&GOLDBOURT.Uric acid &diadetes observation in population study.