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Research Article

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Comparative evaluation of screening tests for maternal and fetal outcome in gestational diabetes

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ABSTRACT

Background: We aimed to evaluate the predictive value of two screening tests - 50 gm GCT and 75 gm GTT for adverse maternal and fetal outcome in patients with gestational diabetes mellitus.

Methods: This was a prospective study of 200 antenatal women booked at tertiary care hospital Delhi during the year 2010-2012. Pregnant females at 24-28 weeks gestation were randomly selected and subjected to 50 gm GCT and 75 gm GTT. The women's history, clinical examination recorded, 50 gm GCT and 75 gm GTT values recorded and the two tests were compared for maternal and fetal outcome.

Results: 75 gm GTT had higher specificity, positive and negative predictive values as compared to 50 gm GCT for both maternal and fetal outcome. However 50 gm GCT was more sensitive for predicting maternal and fetal complications.

Conclusions: 75 gm GTT is better than 50 gm GCT for predicting adverse maternal and perinatal outcome in gestational diabetic patients.

Keywords: Screening tests, Maternal and fetal outcome, GTT, Diabetic patients

INTRODUCTION

The incidence of gestational diabetes in India varies between 3-12%. Compared to European women, prevalence of gestational diabetes has increased eleven fold in women from the Indian subcontinent. Asian women are ethnically more prone to develop glucose intolerance compared to other ethnic groups. Hence universal screening for glucose intolerance during pregnancy is essential in Indian women. Gestational diabetic women are at increased risk of developing preeclampsia, infections, postpartum hemorrhage, type II diabetes, prone for caesarean section and genital injuries. As per recommendation of 5th world congress on diabetes, GCT may not be required in low risk population as it is not cost effective. The Caucasians are less likely to have GDM but Asiatic population is at high

risk for GDM, hence for gestational diabetes should be universal in Indian population. As there are still controversies existing regarding the role of two screening tests, the present study was undertaken to compare the GCT (50 gm) and 75 gm glucose (WHO) for predicting adverse maternal and perinatal outcome.

METHODS

The present study was a prospective study carried out at the Dr. RML hospital, New Delhi. The study participants included 200 booked antenatal women registered at tertiary care hospital with gestational age between 24-28 weeks, admitted for delivery over a 2 year duration from 2010 to 2012. Inclusion criteria were randomly selected pregnant females at 24-28 weeks of gestation. Pregnant females who were known diabetic were excluded from

the study. Detailed history, clinical examination and all relevant ANC investigations were done prior to taking up the patients for screening test for glucose intolerance. All patients enrolled for the study underwent glucose challenge test with 50 gm glucose irrespective of time of food intake. Their blood glucose levels were measured after 1hr. those patients with blood glucose ≥130 mg% were labeled GCT positive.⁶ After 1 week all patients underwent fasting blood glucose and 2 hour postprandial blood glucose after 75 gm of glucose load. Fasting blood sugar ≥126 mg% and/or 2 hour PP ≥140 mg% as per WHO criteria⁶ were labeled GTT 75 gm positive. All patients were followed till delivery. A note was made of maternal complications like PIH, polyhydramnios, infections, IUGR, PROM etc. mode of delivery, birth weight, APGAR at 1 and 5 min, ventilator support and any neonatal complication was also noted.

Comparison was done between two methods of screening gestational diabetes, 50 gm GCT and 75 gm GTT. Their association with maternal and neonatal outcome was studied. All the data was compiled and statistically analysed using SPSS version 15. Data was compiled using chi-square test and Fischer exact test with a two tailed P value <0.05 being considered significant.

RESULTS

Pregnant women at 24-28 weeks of gestation were randomly selected from the antenatal OPD. All the women were subjected to 50 gm GCT and 75 gm GTT and patients were followed up till the time of delivery. The neonates were also followed up till of their discharge from the hospital.

Comparison is done between 50 gm GCT and 75 gm GTT. Their association with maternal and neonatal complication and new born weight has been studied.

Table 1: Result of 50 gm GCT.

50 gm GCT	No. of patients	Percentage (%)
Positive	40	20%
Negative	160	80%
Total	200	100%

Table 2: Result of 75 gm GTT.

75 gm GTT	No. of patients	Percentage (%)
Positive	25	12.5%
Negative	175	87.5%
Total	200	100%

25 pregnant females out of 200 had gestational diabetes as diagnosed with 75 gm GTT. Prevalence of gestational diabetes is found to be 12.5%.

Table 3: Antennal complication.

	GDM group No. (%)	Non GDM group No. (%)
PIH	7 (29.1)	13 (7)
Polyhydramnios	5 (20.8)	3 (1.7)
Oligohydramnios	2 (8.3)	5 (2.8)
IUGR	3 (12.5)	5 (2.8)
UTI and vaginal infection	3 (12.5)	1 (0.56)
Hypothyroidism	2 (8.3)	1 (0.56)
Rheumatic heart disease	0 (0)	1 (0.56)
Premature rupture of membranes	2 (8.3)	0 (0)
Psychiatric illness	0 (0)	1 (0.56)

Most common antenatal complication identified in the diabetic group was pregnancy induced hypertension (29.1%) compared to 7% in the non-diabetic group. This difference was found to be statistically significant (P value <0.05).

20.8% of diabetic females developed polyhydramnios as compared to 1.7% in the non-diabetic group. This difference was statistically significant (P valve 0.00).

- 3 (12.5%) of diabetic women developed urinary tract or vaginal infections as compared to 1 (0.56%) in the non-diabetic females. This difference was also found to be statistically significant.
- 2 (8.3%) of diabetic women had premature rupture of membranes but none of the women had PROM in the non-diabetic group.

8.3% and 12.5% of women developed oligohydramnios and IUGR in the diabetic group as compared to 2.8% in the non-diabetic group. This difference was also statistically significant (P value <0.05).

Table 4: Neonatal complications.

Neonatal complication	GDM group No. (%)	Non GDM group No. (%)
Physiological jaundice	5 (20.8)	24 (13.6)
Hypoglycemia	5 (20.8)	3 (1.70)
Hypoxic ischemic encephalopathy	2 (8.3)	3 (1.70)
Tracheosophageal fistula	1(4.16)	0 (0)
Meconium aspiration syndrome	0 (0)	2 (1.13)
Respiratory distress Syndrome	4 (16.6)	1 (0.56)
Polycythemia	1 (4.16)	1 (0.56)
Cardiac anomalies	2 (8.3)	1 (0.56)
Transirnt tacypnoea of newborn	1 (4.16)	0 (0)
Others	0 (0)	5 (2.84)

20.8% of newborns developed physiological jaundice in GDM group as compared to 13.6% in the non-diabetic group. This difference was found to be statistically significant (P value - 0.003).

20.8% of newborns developed hypoglycemia in GDM patients as compared to 1.70% in the non-diabetic females. This difference was statistically significant (P value - 0.001). Respiratory distress syndrome complicated 16.6% of newborn of diabetic mothers as compared to only 0.56% of non GDM mothers. This difference was highly significant (P value - 0.001).

8.3% of newborn in GDM group had hypoxic ischemic encephalopathy as compared to 1.70% in non GDM group. This difference was also significant.

Two newborns had cardiac anomalies and 1newborn had tracheosophageal fistula in GDM group.

One baby developed polycythemia in both groups. This was not statistically significant.

Table 5: 50 gm GCT and perinatal outcomes.

	50 gm GCT			
Maternal and perinatal outcome	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
Maternal complication	43.4	88.4	57.5	81.3
Large for gestational age newborns	35.7	88.5	62.5	71.9
APGAR at 5 min (<7)	50.0	80.3	2.5	99.4
NICU stay>2 days	36.4	83.1	30.0	86.8
Ventilator support	33.3	80.1	2.5	98.7
Neonatal compilation	38.9	87.0	52.5	79.4

50 gm GCT had good specificity and positive predictive value for perinatal outcome as compared to sensitivity and negative predictive value.

Patients with abnormal GCT had higher incidence of maternal and neonatal complication, LGA newborns, APGAR score <7, prolonged NICU stay and ventilator requirement.

Table 6:75 gm GTT and perinatal outcome.

75 gm GTT					
Maternal and perinatal outcome	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	
Maternal complication	28.3	93.2	60.0	78.3	
Large for gestational age newborns	24.3	93.8	68.0	69.7	
APGAR at 5 min (<7)	50.0	87.9	4.0	99.4	
NICU stay >2 days	33.3	91.6	44.0	87.4	
Ventilator support	33.3	87.8	4.0	98.9	
Neonatal compilation	25.9	92.5	56.0	77.1	

75 gm GTT has high specificity and negative predictive value as compared to 50 gm GCT.

Patients with abnormal 75 gm GTT had higher incidence of maternal and neonatal complication, LGA newborn, APGAR score, NICU stay and ventilator requirement.

DISCUSSION

The incidence of gestational diabetes in India varies between 3-12% compared to European women, prevalence of gestational diabetes has increased eleven fold in women from the India subcontinent. Asia women are ethnically more prone to develop glucose intolerance compared to other ethnic groups. Hence Universal

screening for glucose intolerance during pregnancy is essential of Indian women. Intrauterine exposure to hyperglycemia during the critical period of fetal development programmes, the development of pancreas negatively affects the insulin secretory function leading to poor perinatal outcome. Hence, timely screening all pregnant women for glucose intolerance, achieving euglycemia in them and ensuring adequate nutrition prevent perinatal and maternal morbidities. There are many views on the efficacy and execution of screening tests for GDM. As there are still controversies existing regarding screening for glucose intolerance in pregnant women. The present prospective cohort study "Comparative evaluation of screening test for Gestational Diabetes Mellitus" is a continuum with the numerous studies done for screening Gestational Diabetes.

In the present study, the prevalence of antenatal complications in the GDM patients were pregnancy induced hypertension (29.1%), polyhydramnios (20.8%), UTI and vaginal infection (12.5%), premature rupture of membranes (8.3%), IUGR (12.5%) and oligohydramnios (8.3%). However, in the non-diabetic group these complications were less as there is statistically significant correlation between these complication and Gestational Diabetes Mellitus. Similar results in South India by Mamta et al.⁷ in 2005 found prevalence of PIH (29.3%), polyhydramnios (14.7%), UTI (36.7%) compared to PIH (18.7%), polyhydramnios (2.7%) and UTI (10.7%) in control group. Abdulbari Bener et al.8 in 2011 in Qatar studied the outcome of pregnancy complicated by GDM (12.6% vs. 8.3%) (P value 0.03). A retrospective study of 286 Danish women by Jensen D et al. found 19.6% of GDM patients developed hypertension during pregnancy. Another study of 874 GDM patients found hypertension rate of 17% (P value <0.001).41.7% of newborn of GDM females did not develop any complication compared to 76.7% in the non-diabetic group. This concurs with the study of Ingrid Ostund et al.¹⁰ who found 64.6% of newborn in diabetic group with no complications verses 87.3% in the non-diabetic group.

50 gm GCT was found to be more sensitive for predicting maternal and fetal outcome in terms of large for gestational age newborns, APGAR at 5 min, NICU stay, ventilator support, maternal and neonatal complications. Sensitivity of GCT for these parameters are 35.7%, 50%, 36.4%, 33.3%, 43.7% and 38.9% respectively. However WHO 75 gm GTT is more specific for perinatal outcome prediction as compared to 50 gm GCT. De Sereday et al. 11 studied 99 pregnant women and used macrosomia i.e. birth weight >4000 gm as the reference standard for evaluation. He found the sensitivity of 50 gm GCT and 75 gm GTT as 58.3% and 41.7% respectively. The specificity of these tests were 67.8% and 90.8% respectively. Giorgio Mello et al. 12 studied the prediction of perinatal outcome by 75 gm in 2003. They reported sensitivity, specificity, positive predictive value and negative predictive value were 58.7%, 98.7%, 88% and 93.9% respectively. Rajesh Rajput et al. 13 found prevalence of GDM 7.1% in Haryana diagnosed by 75 gm GTT.

It was found in this study that the specificity, positive and negative predictive value of 75 gm glucose were better than 50 gm GCT.

CONCLUSION

This study has documented the increased prevalence of GDM in the Indian population. Universal screening for glucose intolerance during pregnancy is essential as Indian women have high prevalence of diabetes and their relative risk of developing GDM is 11.3 times compared to white women. The specificity, positive and negative predictive values of 75 gm GTT for predicting perinatal outcome are better and statistically significant as compared to 50 gm GCT. 2 hour 75 gm post plasma ≥140 mg/dl serves both as screening and diagnostic criteria besides being a simple and economical one step procedure.

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Ethical approval: The study was approved by the

institutional ethics committee

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