

Screening For Gestational Diabetes Mellitus with DIPSI Criterion and a Comparative Study of the Pregnancy Outcome in Women with Normal and Abnormal Values

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Abstract

Gestational diabetes mellitus (GDM) is defined as glucose intolerance of variable severity with onset or first recognition during pregnancy. Hyperglycemia during pregnancy is found to be associated with various maternal and perinatal adverse outcomes. Fifth National conference of Diabetes In Pregnancy Study group India, put forth "A single step procedure with a single glucose value" to screen and diagnose abnormal glucose tolerance during pregnancy in the community. Universal screening with DIPSI test is simpler, convenient and economical. In the present study using DIPSI as a test to screen and diagnose GDM in pregnancy, the incidence of GDM was 8%. Majority of GDM mothers were in the age group of 21 to 29 years. 50% of mothers with BMI > 25 Kg/m² developed GDM. 75% of GDM mothers were multigravida and 66.7% had a positive family history of Diabetes mellitus. Polyhydramnios was the most common maternal complication. 25% of the GDM mothers required insulin therapy. 58.3% of the GDM mothers were delivered by Lower Segment Cesarean Section. 41.6% of the babies delivered to GDM mothers were > 3.5 Kgs. Neonatal complications included hypoglycemia, hyperbilirubinemia and respiratory distress.

Key words: GDM, DIPSI, Polyhydramnios

INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as glucose intolerance of variable severity with onset or first recognition during pregnancy¹. All maternal and perinatal complications associated with GDM are potentially preventable with early recognition of GDM, intense monitoring and treatment. To standardize the diagnosis of GDM, World Health Organization (WHO)² has proposed using a 2-h 75 g OGTT. A number of studies have documented that the treatment of gestational diabetes

as defined by WHO criterion reduced serious maternal and perinatal morbidity³⁻⁵. Diabetes in Pregnancy Study Group India (DIPSI) diagnostic criterion of 2-h venous plasma glucose with 75 g oral glucose load is a modified version of WHO, in that the WHO procedure requires women to be in the fasting state, whereas DIPSI procedure is performed in the fasting/nonfasting state irrespective of the last meal timing⁶. Hence, this prospective study was undertaken to ascertain the validity of DIPSI criterion to diagnose GDM based on pregnancy outcome in Indian population.

MATERIALS AND METHODS

A prospective study was performed on randomly selected 150 antenatal patients between 24-28 weeks of gestation attending outpatient department in the Department of obstetrics and gynecology, Victoria Government Hospital for Women and Children attached to Andhra Medical

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College, Visakhapatnam from April 2017 to July 2017 to find the incidence of GDM with 75 grams DIPSII Test. Women who were not within 24-28 weeks of gestation and women with pre gestational diabetes were excluded from the study. Informed written consent was obtained from each patient before enrolling in the study. All women were clinically evaluated by a detailed history including family h/o DM and anthropometric measurements were recorded at their first visit. A proper general, systemic and obstetric examination paying special attention to their obstetric complications was done. Every antenatal woman irrespective of last meal was given 75 grams of glucose load in 200ml of water and blood sample was collected after 2 hours. Diagnosis of GDM was made if the 2 hours post glucose was ≥ 140 mg/dl. The plasma glucose was estimated by the glucose oxidase peroxidase (GOD POD) method. Venous blood was collected in a fluoride containing test tube. Plasma was preferred. Sodium fluoride was added to prevent glycolysis. All the cases were followed till delivery and maternal and fetal outcome were noted. The data was analysed to correlate normal and abnormal DIPSII TEST results with maternal and fetal outcomes. Results were analysed with Chi-square test. A p value of < 0.05 was considered significant.

RESULTS

Among the 150 mothers included in the study, there was no incidence of adverse effects of nausea and vomiting. All the mothers accepted the test readily. The incidence of GDM in the present study was 8%. The minimum age was 19 years and maximum age was 38 years. Mean age of cases included in the study was 25.65yrs. 9(75%) mothers with GDM were euglycemic with modified nutrition therapy while 3(25%) mothers with GDM required insulin for glycemic control. All the other results are shown in the (Tables 1-12).

DISCUSSION

“DIPSII – A modified version of WHO criteria is a one step procedure with a single glycemic value”. In the antenatal clinic, a pregnant woman after undergoing preliminary clinical examination is given a 75 g oral glucose load, irrespective of whether she is in the fasting or non fasting state, without regard to the time of the last meal. A venous blood sample is collected at 2 hours for estimating plasma glucose. GDM is diagnosed if 2-hr plasma glucose is greater than or equal to 140mg/dl. Universal screening with DIPSII test is simpler, convenient and economical. Ethnically Indian women are more prone to develop glucose intolerance during pregnancy and have eleven fold increased risk compared to White Caucasians necessitating universal

Table 1: Incidence of GDM

Total no of cases screened	150
Number of cases detected having GDM	12
Incidence of GDM	8%

GDM: Gestational diabetes mellitus

Table 2: Age distribution of DIPSII test cases

Age in years	DIPSII test negative	DIPSII test positive	Total
< 20 years			
Number of patients (%)	14 (10.1)	0 (0)	14 (9.3)
21-24			
Number of patients (%)	41 (29.7)	4 (33.3)	45 (33.3)
25-29			
Number of patients (%)	65 (47.1)	5 (41.7)	70 (46.7)
30-34			
Number of patients (%)	16 (11.6)	2 (16.7)	18 (12.7)
>35			
Number of patients (%)	2 (1.5)	1(8.3)	3 (2)
Total			
Number of patients (%)	138 (100.0)	12 (100.0)	150 (100.0)

Table 3: BMI distribution among DIPSII tested cases

BMI in kg/m ²	DIPSII test negative	DIPSII test positive	Total
<20			
Number of cases (%)	37 (26.9)	2 (16.7)	39 (26.0)
20.1-24.9			
Number of cases (%)	95 (68.8)	4 (33.3)	99 (66.0)
25-29.9			
Number of cases (%)	6(4.3)	6 (50)	12 (8.0)
>30			
Number of cases (%)	0 (0)	0 (0)	0 (0)
Total			
Number of cases (%)	138 (100.0)	12 (100.0)	150 (100.0)

BMI: Body mass index

Table 4: Obstetric score among DIPSII tested cases

Obstetric score	DIPSII test negative	DIPSII test positive	Total
PRIMI			
Number of cases (%)	64 (46.4)	3 (25)	67 (44.7)
GRAVIDA 2			
Number of cases (%)	51 (37)	2 (16.7)	53 (35.3)
GRAVIDA 3			
Number of cases (%)	16 (11.6)	5 (41.6)	21 (14.0)
GRAVIDA 4			
Number of cases (%)	6 (4.3)	2 (16.7)	8 (5.3)
GRAVIDA 5			
Number of cases (%)	1 (0.7)	0 (0.0)	1 (0.7)
Total			
Number of cases (%)	138 (100.0)	12 (100.0)	150 (100.0)

screening during pregnancy⁷. Recent data on the prevalence of GDM in our country was 16.55% by WHO criteria of 2-hr plasma glucose ≥ 140 mg/dl⁸. So, universal screening

Table 5: Family history among DIPSi tested cases

Family history	DIPSi test negative	DIPSi test positive	Total
No			
Number of cases (%)	130 (94.2)	4 (33.3)	134 (89.3)
Yes			
Number of cases (%)	8 (5.8)	8 (66.7)	16 (10.7)
Total			
Number of cases (%)	138 (100.0)	12 (100.0)	150 (100.0)

Table 6: Maternal complications among DIPSi tested cases

Maternal complications	DIPSi test negative	DIPSi test positive	Total
Polyhydramnios			
Number of cases (%)	6 (35.3)	6(50)	12 (41.3)
Preeclampsia			
Number of cases (%)	6 (35.3)	1(8.3)	6 (20.7)
Urinary tract Infections			
Number of cases (%)	5 (29.4)	5 (41.7)	6(20.7)
Total			
Number of cases (%)	17 (100)	12 (100)	29 (100)

Table 7: Mode of treatment

Mode of treatment	Number of cases	Percentage
Diet	9	75
Insulin	3	25

Table 8: Gestational age at delivery

Gestational age at delivery	DIPSi test negative	DIPSi test positive	Total
<37 weeks			
Number of cases (%)	17 (12.3)	8 (66.7)	25(16.7)
≥37 weeks			
Number of cases (%)	121(87.7)	4(33.3)	125 (83.3)
Total			
Number of cases(%)	138 (100.0)	12 (100.0)	150 (100.0)

Table 9: Mode of delivery

Mode of delivery	DIPSi test negative	DIPSi test positive	Total
EL LSCS			
Number of cases (%)	8(5.8)	6(50)	14(9.3)
EM LSCS			
Number of cases (%)	14 (10.1)	1 (8.3)	15 (10.0)
FTVD			
Number of cases (%)	105 (76)	1 (8.3)	106 (70.7)
PTVD			
Number of cases (%)	11 (7.9)	4(33.4)	15(10.0)
Total			
Number of cases (%)	138 (100.0)	12 (100.0)	150 (100.0)

of all Indian pregnant women is mandatory. This requires a simpler, economical and more feasible screening test in low resource and high risk countries like India. Seshiah *et al*⁹, recommended DIPSi as a single step procedure

Table 10: Birth weight among DIPSi tested cases

Birth weight in kg	DIPSi test negative	DIPSi test positive	Total
≤2.5			
Number of cases (%)	30 (21.7)	1(8.3)	31 (20.7)
2.6-3			
Number of cases (%)	68 (49.3)	3(25)	71 (47.3)
3.1-3.5			
Number of cases (%)	37 (26.8)	3 (25)	40 (26.7)
3.6-3.9			
Number of cases (%)	3 (2.2)	4(33.4)	7(4.6)
≥4			
Number of cases (%)	0 (0)	1(8.3)	1(0.7)
Total			
Number of cases (%)	138 (100.0)	12 (100.0)	150 (100.0)

Table 11: APGAR score among DIPSi tested cases

APGAR score	DIPSi test negative	DIPSi test positive	Total
≤4			
Number of cases (%)	2 (1.4)	0 (0.0)	2 (1.3)
5-7			
Number of cases (%)	12 (8.6)	3 (25)	15 (10.0)
≥8			
Number of cases (%)	124 (89.7)	9 (75)	133 (88.7)
Total			
Number of cases (%)	138 (100.0)	12 (100.0)	150 (100.0)

Table 12: Neonatal complications

Neonatal complications	DIPSi test negative	DIPSi test positive	Total
Hypoglycemia			
Number of cases (%)	2 (16.6)	3 (37.5)	5 (25)
Hyperbilirubinemia			
Number of cases (%)	6 (50)	3(37.5)	9 (45)
Respiratory distress			
Number of cases (%)	4 (33.3)	1 (12.5)	5 (25)
Hypocalcemia			
Number of cases (%)	0 (0.0)	1 (12.5)	1(5)
Neonatal death			
Number of cases (%)	0 (0.0)	0 (0.0)	0 (0.0)
Total			
Number of cases (%)	12 (100)	8 (100)	20 (100)

irrespective of the last meal. The ideal time for screening for GDM is usually done at 24-28 weeks of gestation because insulin resistance increases during the second trimester and glucose levels rise in women who do not have the ability to produce enough insulin to adopt this resistance. Seshiah V *et al* reported an incidence of 13.4% of GDM in antenatal women. The incidence in the present study is 8%. Maternal age is an established risk factor for gestational diabetes mellitus. The study by Terence T Lao *et al.* observed that the risk of GDM becomes significantly and progressively increased from 25 years onwards. In present study, 66.7% women were above 25 years. 10 (74%) GDM mothers had BMI more than 20Kg/m²(P value < 0.0001).

Moses et al showed that GDM was present in 11.6% cases with a positive family history of diabetes. In the present study, 66.7% ($p < 0.00001$) of the DIPSII test positive mothers had a family history of diabetes mellitus. In the present study, 75% of DIPSII test positive cases were multigravida. 6 cases (50%) of DIPSII test positive cases had polyhydramnios. The study by Usha Krishna et al reported a 28% incidence of Polyhydramnios and 48% incidence of Preeclampsia. Sobande et al. reported polyhydramnios as the most common antenatal complication, significantly higher in Type I diabetes mellitus. Danne F et al. reported risk of developing polyhydramnios 3 times higher in diabetic compared to non diabetic pregnant women. In the present study 1 woman (8.3%) of the DIPSII positive cases developed preeclampsia. Garner et al showed that preeclampsia was twice as high in GDM¹⁰. In the present study, 5 women(41.7%) of the DIPSII positive cases developed urinary tract infections. Premature labour occurs upto 20% in diabetic pregnancies. In present study 66.7% of DIPSII positive cases had preterm delivery ($X^2=23.47$ & $p < 0.001$) and 12.3% in DIPSII negative cases. Sibai and colleagues reported that 9% of women spontaneously delivered before 35weeks compared with 4.5% of non diabetic women. In present study 58.3% DIPSII positive GDM cases had LSCS and 33.4% GDM cases had preterm vaginal delivery ($X^2=37.42$ & p value <0.00001) and 8.3% cases had term vaginal delivery. Huddle K R and Kapoor N et al. reported caesarean section in $>60\%$ cases. Most, but not all, of the fetal and neonatal sequelae of diabetes during gestation are a function of maternal glycemic control. 5 (41.7%) babies born to GDM mothers had birth weight > 3.5 Kg ($X^2=36.817$, $p < 0.001$). H Nagy et al¹¹ reported that hypoglycemia(39%), hyperbilirubinaemia(32%), respiratory distress (22%) occurred in neonates born to GDM mothers. In the present study, hypoglycemia(37.5%), hyperbilirubinaemia(37.5%), respiratory distress (12.5%) occurred in neonates born to GDM mothers. In present study birth weight of ≥ 3.5 kgs is observed in 41.7% of GDM cases compared (p value <0.001) with 2.2% in non GDM cases. All babies in GDM group had good Apgar because of good glucose control and prompt delivery and resuscitation. O ‘sullivan et al. reported that the perinatal

mortality was 6.4% among GDM when compared to normal controls. There were no congenital anomalies noted in GDM women. In present study there was no Perinatal, Neonatal and Maternal mortality.

CONCLUSION

Indian women are more prone to gestational diabetes during pregnancy, hence there is a need for universal screening. For universal screening, DIPSII TEST with 75 grams as a one step screening and diagnostic procedure is recommended. One step procedure is less time consuming, economical and feasible. During our study, detected GDM patients were closely monitored and treated with either insulin or diet plan (Medical Nutrition Therapy) which reduced the adverse obstetric and perinatal outcome.

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