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Research Article

Gestational diabetes mellitus diagnosed with single test glucose screening test and its outcome in a tertiary hospital in South India

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ABSTRACT

Background: 1) To assess maternal and neonatal outcomes after screening, diagnosing and treating GDM. 2) Role of single test glucose screening test (GST) in diagnosing gestational diabetes mellitus (GDM) in our population.
Methods: A one year retrospective study of women diagnosed with and treated for GDM from Jan 2014 to Dec 2014 at SDM medical college and hospital, Dharwad, Karnataka, India. Case records were retrieved to collect data on maternal and neonatal outcome, glycemic control and diabetic management. Single test GST, as per the latest DIPSI guideline was the test used to diagnose GDM i.e. 75 gm of glucose was given to all pregnant women between 24- 34 weeks of pregnancy, irrespective of the last meal and time of the day and after two hours, plasma glucose was estimated. Women with a 2-hr plasma glucose value of >140 mg/ dl were diagnosed to have GDM and were not subjected further for oral glucose tolerance test (OGTT). In women with high risk factors for GDM, the test was performed in the Ist trimester or at their first visit to the hospital.
Results: All booked women in the study period underwent GST i.e. we could do universal screening .The incidence of GDM was 4.8%. 147 women were diagnosed to have GDM out of 3050 women screened for GDM. Of the affected women, 74.1% were managed with diet alone and 24.9% received insulin treatment. Good glycemic control improved both maternal and neonatal outcome. Poor glycemic control and presence of preeclampsia were risk factors for maternal and neonatal complications.
Conclusions: Single test GST is a patient friendly and effective approach to screen women for GDM especially in high risk ethnic population. Timely and aggressive management helps improve maternal and neonatal outcomes and also decrease the future risk of development of diabetes both in the mother and the fetus.

Keywords: GDM, GST, OGTT

INTRODUCTION

The prevalence of gestational diabetes mellitus (GDM) is increasing globally, more so in developing countries including India where the prevalence is estimated to range between 3.8% to 21%.[1] GDM is not only associated with maternal and fetal complications but also increases the likelihood of subsequent diabetes in the mother as well as the fetus. Managing GDM is like primary prevention of diabetes for the next generation. The prevalence of DM is increasing at an alarming rate of > 120% from 135 million in 1995 to 300 million in 2025.[2] Universal screening for GDM is necessary and will help India become "the world's diabetes care capital" instead of "diabetes capital of the world". Fasting plasma glucose estimation is not necessary for screening WHO is not in favour of estimating fasting blood glucose for screening. A single test procedure with 75 gm of glucose in the non fasting state was found to be similar to WHO oral glucose tolerance test (OGTT) in diagnosing GDM by V. Seshaih et al in their study in Indian population.[3] So we have adopted the single test glucose screening test (GST) done in the non - fasting state for screening GDM in our population.

METHODS

A one year retrospective study of women diagnosed with and treated for GDM from Jan 2012 to Dec 2012 at SDM medical college and hospital, Dharwad. Case records were retrieved to collect data on maternal and neonatal outcome, glycemic control and diabetic management. Single test GST, as per latest DIPSI guideline was used to diagnose GDM i.e. 75 gm of glucose was given to all pregnant women between 24 - 34 weeks of pregnancy, irrespective of the last meal and time of the day and after two hrs plasma glucose was estimated. In women with high risk factors for GDM, Ist trimester screening or at their first visit to the hospital. Patients with preexisting DM were excluded. 2 hr plasma glucose value of >140 mg/ dl à GDM and were not subjected further for OGTT. Medical nutrition therapy (MNT) was advised. FBS and PPBS were done after two weeks.

High GST values and advanced gestational age patients were preferably admitted.

Supervised diet therapy and complete blood sugar profile was done.

- Fasting capillary glucose (FCG),
- two hour post breakfast,
- pre lunch, post lunch,
- pre dinner and post dinner capillary glucose values.

The target values:

- Fasting values - 90 to 100 mg/dl
- 2 hour postprandial values - 120 to 140mg/dl.
- If most of the values were high on repeated testing, patients were started on Insulin therapy.

RESULTS

3050 booked patients underwent screening for GDM and delivered at this institution during the study period & 147(4.8%) were diagnosed to have GDM. Maternal and fetal outcomes were analysed. Maternal parameters like development of preeclampsi, PROM, preterm labour, mode of delivery, induction of labour glycemic control, medical nutrition therapy (MNT) & need for insulin with MNT were studied. Fetal parameters like macrosomia, fetal growth restriction, hyperbilirubinemia, hypoglycemia, admission to NICU, APGAR score were studied. The most common age group of women with GDM was between 25-35 years ie 83.67%. 14% of women were > 35 yrs and only 2% of women were in the age group of 19-24 yrs.

About 42.81% of women were overweight. 109(74.1%) women were managed with MNT with good glycemic control. 38 (24.9%) women needed insulin therapy; seven women had poor glycemic control even with insulin. The overall gestational age at delivery was 38 weeks. Induction of labour was done in 44.89%. The rate of cesarean section in women with GDM was 45.57%, the rate increased to 76.31% in women requiring insulin. The rate of macrosomia among GDM women with uncontrolled sugars was 85.71% but in controlled group it was 10.52%. Perinatal mortality rate in our series was found to be 3.4%. There were two intrauterine deaths in patients on insulin with poor control.

One patient with GDM on insulin and severe preeclampsia had spontaneous preterm delivery of a fresh stillborn fetus.

- There were two neonatal deaths,one had congenital heart disease and died after 15 days of NICU care.
- The second baby had hydrocephalus, was an induced preterm delivery and incidentally the mother had mild GDM.
- Preeclampsia was seen in about 10.88% of women with GDM and had higher rates of induced labour, admission to NICU, FGR including two perinatal deaths.

Table 1: Maternal outcome among women with GDM treated by MNT alone and insulin.

Outcome	MNT Alone Number :109	%	Insulin Number 38	%	p value
Preeclampsia	06	5.50%	10	26.31% 73.69	$\chi^2 = 12.58$ 0.00039
Cesarean Section	38	34.86%	28	76.32%	$\chi^2 = 19.52$ 0.000000995
PROM	10	9.1	9	23.68	$\chi^2 = 5.27$ 0.021684
Induction of labour	54	49.54	12	31.57	$\chi^2 = 3.67$ 0.055244
Preterm delivery	3	2.75	5	18.42%	Fischer exact test statistic = 0.028 < 0.05

Table 2: Fetal outcome among women with GDM treated by MNT alone and insulin.

Outcome	MNT Alone Number :109	%	Insulin Number 38	%	p value
Macroso-mia	17	15.59%	10	26.31 .69	$\chi^2 = 2.16$ 0.141702
Jaundice requiring photothe-rapy	11	10.09	09	23.68	$\chi^2 = 4.43$ 0.0353
Hypogly-cemia	03	2.75%	02	5.26	Fischer exact test statistic = 0.6041 > 0.05
APGAR score at 1 min < 7	03	2.75%	01	2.63	Fischer exact test statistic = 1.0 > 0.05
Admission to NICU	07	6.42	06	15.78	$\chi^2 = 3.07$ 0.079894
FGR	09	8.25	12	31.58	$\chi^2 = 12.52$ 0.000403
Death	01	0.92	4	10.52	Fischer exact test statistic = 0.016 < 0.05
Still birth	-	-	03	7.9%	
Neonatal death	01	0.92	01	2.63	Fischer exact test statistic = 0.4515 >0.05
Shoulder dystocia	02	1.83	0	0	

Table 3: Characteristics of women with GDM

Parity	MNT Number: 109	MNT %	Insulin Number:38	Insulin %	p value
Primi	39	35.77	08	21.05	$\chi^2 = 0.09$
Multi	70	64.23	30	78.95	0.093692
Maternal age					
20-24yrs	03	2.76	10	26.32	$\chi^2 = 30.83$
25-35yrs	102	93.57	21	55.26	<0.00001
>35yrs	04	3.67	07	18.42	
Maternal BMI					
<19	02	1.83	07	18.42	
20-25	63	57.79	05	13.15	$\chi^2 = 34.15$
25-29	41	37.62	20	52.63	0.000123
>30	03	2.76	06	15.78	

DISCUSSION

- Indians are at an increased risk of developing GDM and DM.
- Women with a history of GDM are more likely to get diabetes later as are their children.
- So GDM women are an ideal group for the primary prevention of DM.
- This means that our women should undergo universal screening for GDM and for this we need a simple, patient friendly test.
- So we have adopted the single test GST done in the non - fasting state for screening GDM in our population.
- The nonfasting 2 hrs post 75 gms of glucose concentration strongly predicts adverse outcome in the mother as well as the fetus.
- All antenatal patients attending the OBG OPD during the study period underwent screening for GDM.so we could do universal screening for GDM.
- This will help for the primary prevention of DM in our country in addition to reduction of perinatal and maternal complications of undiagnosed GDM.

Table 4: Outcome of women on insulin.

Outcome	Good Control No: 31	%	Poor Control No: 07	%	p value
Preecla-mpsia	07	22.58	03	42.85	Fischer exact test statistic = 0.3510 >0.05
Cesarean section	23	74.19	06	85.71	Fischer exact test statistic = 0.66 >0.05
Preterm delivery	02	6.45	03	42.85	Fischer exact test statistic = 0.0346 <0.05
Macrosomia	04	12.9	06	85.71	Fischer exact test statistic = 0.005 <0.05
Jaundice	04	12.9	05	71.42	Fischer exact test statistic = 0.0042 <0.05
Hypogly-cemia	-	-	02	28.57	
APGAR at 1st min<7	-	-	01	14.28	
Admission to NICU	02	6.45	05	71.42	Fischer exact test statistic = 0.0008 <0.05
FGR	09	29.03	03	42.85	Fischer exact test statistic = 0.6560 >0.05
Perinatal Death	01	3.22	04	57.15	Fischer exact test statistic = 0.0022 <0.05

Universal screening for GDM plays an important role in this era of increasing obesity and sedentary life style which are important risk factors for GDM along with our high risk ethnic race.

MNT is the main treatment for GDM. This was seen in our study as well, 74.1% of women were treated with diet alone.

Macrosomia is an important complication of GDM. Inspite of universal screening in our series, macrosomia was seen in 13.60% of women.

Fetal hyperinsulinemia occurs as early as 16th week of pregnancy and thus maternal hyperglycemia in the Ist trimester should be avoided to reduce the risk of macrosomia.

Hence screening as early as 16th week is advisable in patients with average risk factors for GDM.

Fetal outcome does not vary significantly among women who are treated with diet alone or with diet and insulin with good glycemic control.

Several studies suggest an increased rate of preeclampsia among women with GDM.[4]

Maternal diabetes and preeclampsia is associated with poor perinatal outcome.

In our series 10.55% of the women with GDM developed preeclampsia which is similar to study done by Lao TT et al.[5]

CONCLUSIONS

Single test GST is a patient friendly and effective approach to screen women for GDM especially in high risk ethnic population where universal screening is required.

Timely and aggressive management helps improve maternal and neonatal outcome and also decrease the future risk of development of diabetes both in the mother and the fetus.

Table 5: Maternal and fetal outcome according to presence / absence of preeclampsia among women with GDM.

Outcome	Preecla-mpsia :16	%	Without Preeclampsia :131	%	p value
Induction of labour	12	75	76	58	Fischer exact test statistic = 0.28 >0.05
Cesarean section	07	43.75	60	45.80	χ^2 = 0.02 0.876394
Preterm delivery	04	25	04	3.05	Fischer exact test statistic = 0.0052 <0.05
Macrosomia	01	6.25	26	19.84	Fischer exact test statistic = 0.31 >0.05
Jaundice	09	56.25	11	8.39	χ^2 = 27.78 0.000000136
APGAR score at 1 min < 7	02	12.5	02	1.52	Fischer exact test statistic = 0.0588 <0.05
Admission to NICU	06	37.5	07	5.34	χ^2 = 18.29 0.0000019
Hypogly-cemia	02	12.5	03	2.29	Fischer exact test statistic = 0.0917 >0.05
FGR	10	62.5	11	8.39	χ^2 = 34.08 0.000000000000528
Perinatal Death	02	12.5	03	2.2	Fischer exact test statistic = 0.0917 >0.05
Neonatal death	01	1.83%	01 37	-	0.4515
Shoulder dystocia	02	-	0 38	-	1.0000

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