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Original Research Article

Screening for GDM in first trimester of pregnancy and its outcome

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ABSTRACT

Background: GDM is associated with increased risk of complications for both mother and fetus both during pregnancy as well as in the postpartum period. Screening for GDM is important to improve short and long term maternal and fetal outcomes. The main purpose of this review is to provide an update on screening for GDM. As per DIPSI criteria women can be diagnosed to have GDM in the first trimester, if the 2hour 75gms OGTT IS 140-199 mg/dL. A prospective observational study with 300 cases was conducted for a period of 1year and 11months (December 2012-2014) in VIMSAR Burla, Sambalpur.
Methods: Universal screening was applied by means of DIPSI. Analysis was done by means of t-test, Odd's ratio, chi squire test. P<.05 was taken as significant.
Results: In the present study, 25 cases were diagnosed as GDM with an incidence of 8.33%. Hypertensive disorders of pregnancy (HDP) was found significantly associated with GDM cases (p value 0.02). The mean birth weight in women with GDM (3.05±0.47Kg) was higher than in women with non-GDM (2.65±0.43 Kg). Overall the macrosomia (≥4Kg) rate was 0.67% with 8% in case of GDM mothers. Not a single case of congenital fetal anomaly was detected in the GDM group under our study 20% of the GDM group had their babies admitted to NICU as compared to 17.65% of the non-GDM group (p value 0.76).
Conclusions: Women with GDM are at an increased risk for adverse obstetrics and perinatal outcomes. Due to high prevalence of GDM in India early universal screening is essential. Screening for glucose intolerance during the early weeks of pregnancy is beneficial as this policy would help in identifying undiagnosed diabetes prior to conception and to render appropriate care. Screening and diagnosis of GDM with a single test procedure of 75g 2hr PGBS in a non-fasting woman i.e. following DIPSI guidelines is found to be effective, simple, economical and feasible.

Keywords: GDM, Maternal and Perinatal outcome, Screening

INTRODUCTION

Pregnancy is a diabetogenic condition as a result of progressive rise in the level of estrogen, progesterone, human placental lactogen, cortisol, prolactin, and are major contributors to the insulin-resistance and cause abnormal glucose tolerance in some women rendering them prone for gestational diabetes mellitus.[1] O'Sullivan was the first person to use the term Gestational Diabetes Mellitus in 1961.[2]

Gestational diabetes mellitus (GDM) is defined as, "carbohydrate intolerance of variable severity with onset or first recognition during pregnancy".[3] Every 1 out of 200 pregnancies is complicated by diabetes mellitus and additionally 5 in every 200 pregnant women will develop gestational diabetes mellitus (GDM).[4] GDM is diagnosed in approximately 3-7% of pregnancies.[5-7] The incidence of GDM increases in older and more obese pregnant women. GDM increases the risk of certain pregnancy complications like pregnancy induced hypertension and

adverse perinatal outcome, it carries the risk of later development of type 2 diabetes mellitus (DM) in 75% of cases.[2,3,5-9] The diabetes in pregnancy study group india (DIPSI) is reporting practice guidelines for GDM in the Indian environment. Due to high prevalence, screening is essential for all Indian pregnant women.

Women with GDM are at increased risk for the development of diabetes, usually type 2, after pregnancy. Obesity and other factors that promote insulin resistance appear to enhance the risk of type 2 diabetes after GDM. Offspring of women with GDM are at increased risk of obesity, glucose intolerance, and diabetes in late adolescence and young adulthood.[10]

The incidence of GDM varies widely amongst populations, with significantly higher rates among South East Asian Region (SEAR), compared with whites.[11,12] Women diagnosed with GDM are at increased risk for a variety of pregnancy complications including gestational hypertensive disorders, foetal macrosomia, shoulder dystocia, and caesarean delivery.[13,14] Diagnosis of both GDM and milder abnormal glucose tolerance in pregnancy helps to identify women who are at high risk for type 2 diabetes.[15-18] GDM confers a 7-fold risk for future type 2 diabetes and upto one-third of women with type 2 diabetes have been diagnosed with GDM.[19,20]

The usual recommendation is to perform screening between 24-28weeks of gestation though 40% of women with GDM could be detected in the early weeks of pregnancy. Screening for glucose intolerance during the early weeks of pregnancy is beneficial as this policy would help in identifying undiagnosed diabetes prior to conception and to render appropriate care. It is also prudent to advice a pregnant woman to undergo rescreening in the later weeks of pregnancy if she had normal glucose tolerance (NGT) in the first visit that is likely to predict the possibility of pregnant women developing gestational diabetes in the later weeks of pregnancy to keep them under surveillance. Hence this study was undertaken.

The most recent research relating to GDM, endeavours to address aspects of the debate by determining the association of maternal hyperglycaemia with an increased risk of adverse pregnancy outcome (Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) study cooperative group, 2008) and ascertaining whether treatment of the condition can decrease perinatal morbidity.[21,22] The different screening tests used are

- Random blood sugar estimation
- Fasting blood sugar estimation
- 50g glucose challenge test (GCT)
- 75g oral glucose tolerance test (OGTT)
- Serum fructosamine estimation
- Glycosylated haemoglobin (HbA1c) estimation
- Urine test- Glycosuria.

Table 1: With 75gm OGTT (WHO criteria).

2hr Plasma glucose	In pregnancy	Outside pregnancy
≥ 200 mg/dl	Diabetes	Diabetes
140 - 199 mg/dl	GDM	IGT
120 - 139 mg/dl	GGI	Normal
< 120 mg/dl	Normal	

Gestational weeks at which screening is recommended

Insulin is detectable in the fetal pancreas as early as 9weeks after conception. An increase in pancreatic beta cell mass and insulin secretion in the foetus occurs by the 16th week of gestation, in response to maternal hyperglycemia.[23,24] The priming of the fetal beta cells may account for the persistence of fetal hyperinsulinemia throughout pregnancy and the risk of accelerated fetal growth, even when the mother enjoys good metabolic control in later pregnancy.[25,26] This necessitates performing the test procedures to diagnose GDM in the first trimester itself. Further, early detection and care results in a better fetal outcome.[27] The aims and objectives of the present study were to screen all the pregnant women in the 1st trimester of pregnancy as per DIPSI guidelines and to know the prevalence of GDM in our community. Also, to determine the risk factors of GDM and to determine the maternal and foetal outcome of GDM.

METHODS

Study place

The present study entitled “Screening for GDM in first trimester of pregnancy and its outcome” was conducted in the department of obstetrics and gynaecology, V.S.S. Medical College and Hospital, Burla, Sambalpur, Odisha.

Study period

December 2012 to October 2014.

Study type

Prospective Observational study

Inclusion criteria

Pregnant women attending antenatal clinic of Obstetrics and Gynaecology department of VSS MCH, Burla who were in first trimester of pregnancy were taken as cases.

Exclusion criteria

- Patients with known type 1 or type 2 Diabetes mellitus,
- Chronic diseases / cardiac / hepatic / respiratory diseases,

- Taking drugs that alter glucose metabolism.

RESULTS

Out of 300 subjects evaluated, 25 (8.33%) were diagnosed as GDM. The remaining formed the non GDM group. The overall mean age is 24.77±3.67 years.

The mean age of GDM group is 32.08±3.29 years and the mean age of non-GDM is 24.11±2.91 years. Most (80%) of GDM women were in the age group of >30 years which is significantly associated (p value <0.001 whereas most (61.82%) of the non-GDM women were in the age group of 21-25 yrs.

Majority of the patients with GDM were second gravida and above (19/25, 76%) whereas majority in the non GDM group were primigravidas (168/275, 61.1%). So, GDM is more common in multigravida which is statistically highly significant (p value <0.001).

Table 2: Distribution of GDM and Non-GDM cases according to past history of GDM and family history of DM.

	GDM		NON-GDM		Total		P value
	Number (25)	%	Number (275)	%	Number (300)	%	
Past history of GDM	3	12	0	0	3	1	<0.0001
Family history of DM	19	76	97	35.27	116	38.67	<0.0001

12% of women with GDM had past history of GDM and 76% of GDM women had family history of DM whereas none of the women of non-GDM had past history and 35.27% of non-GDM group had family history of DM. Both, past history of GDM and family history of DM are significantly associated with GDM (p value <0.001).

Table 3: Distribution of GDM and Non-GDM cases according to past history of foetal loss.

Past history of foetal loss	GDM		Non-GDM		Total	
	Number (25)	%	Number (275)	%	Number (300)	%
Present	16	64	46	16.73	62	20.67
P value	< 0.0001					

Table 4: Distribution of BMI in GDM group and non-GDM group.

	GDM		Non-GDM		Total	
BMI (kg/m^2)	Number (25)	%	Number (275)	%	Number (300)	%
< 25	4	16	160	58.18	164	54.66
25-29	5	20	67	24.36	72	24
≥ 30	16	64	48	17.46	64	21.34
Mean	30.57		24.87		25.34	
SD	4.09		3.41		3.8	

GDM is significantly associated with past history of foetal loss (p value < 0.0001).

64% women of GDM group had BMI ≥30Kg/m^2 showing a highly significant association (p value <0.001) between obesity (BMI ≥30 Kg/m^2) and GDM.

Mean BMI was higher in women with GDM (30.57±4.09Kg/m^2) than non-GDM (24.87±3.41Kg/m^2).

HDP is seen in 5 out of 25 (20%) of GDM cases whereas it is seen in 19 out of 275 (6.91%) of non-GDM cases. HDP is found to be significantly associated with GDM (p value 0.02) as shown in Table 5.

Table 5: Presence of Hypertensive disorders of pregnancy(HDP) in GDM group and non-GDM group.

HDP	GDM		Non-GDM		Total	
	Number (25)	%	Number (275)	%	Number (300)	%
Present	5	20	19	6.91	22	7.33
Absent	20	80	256	93.09	278	92.67
P value	0.02					

Table 6: Distribution of GDM and Non-GDM cases according to mode of delivery.

Mode of delivery	GDM		Non-GDM		Total	
	Number (25)	%	Number (275)	%	Number (300)	%
Normal vaginal	14	56	170	61.82	179	59.67
Instrumental	3	12	22	8	25	8.33
LSCS	8	32	83	30.18	96	32

Incidence of operative delivery is more in GDM cases, i.e. 12% had instrumental delivery and 32% had LSCS whereas in non-GDM cases 8% had instrumental delivery and 30.18% had LSCS which is not statistically significant (p value 0.56) as shown in Table 6.

Table 7: Distribution of GDM and Non-GDM group according to maternal morbidity during puerperium.

Puerperal complications	GDM		Non-GDM		Total		
	Number (25)	%	Number (275)	%	Number (300)	%	P value
Normal puerperium	21	84	248	90.18	269	89.67	0.33
Puerperal pyrexia	1	4	8	2.91	9	3	0.76
Perineal wound infection	1	4	19	6.91	20	6.67	0.57
Sub-involution of uterus	2	8	0	0	2	0.66	< 0.001

The mean birth weight in women with GDM (3.05±0.47 Kg) was higher than in women with non-GDM (2.65±0.43Kg). Majority (52%) of GDM cases had birth weight of 3-3.9Kg whereas majority (76.73%) of non-GDM cases had birth weight of 2-2.9Kg. GDM is significantly associated with birth weight of ≥3Kg (p value < 0.0001).

Apgar score of 1-3, 4-6 and 7-10 is seen in 0.73%, 4.03% and 95.24% of babies of non-GDM whereas in GDM it is 0%, 8% and 92% respectively which is not statistically significant (p value >0.05). Neonatal complications like IUGR, macrosomia, meconium stained liquor (MSL) and hypoglycemia are proportionately more in GDM group than in non-GDM group. Only macrosomia and hypoglycemia are found to be significantly associated with GDM (p value < 0.05). Amongst 300 women, 53 women had their babies with some or the other complication leading to NICU (Neonatal Intensive Care Unit) admission. 20% women belonging to GDM group had their babies admitted to NICU as compared to 17.65% women of the non-GDM group with babies requiring NICU admission which is not statistically significant (p value 0.76) as shown in Table 7.

3 out of 25 GDM cases were lost to follow-up. The above table reveals that 22.73% of GDM cases had Impaired fasting glucose (IFG) and 27.27% of GDM cases had Impaired glucose tolerance (IGT) during follow-up at 6-12weeks post-partum and 77.27% of GDM cases had normal FBS and 72.73% of GDM cases had reverted to normal 2hr PGBS level.

DISCUSSION

The prevalence of GDM is reported to vary widely from 3.8 to 21% in different parts of India depending on the geographical location and on the diagnostic criteria used.[28] GDM has been associated with neonatal morbidity and mortality, including macrosomia, shoulder dystocia, other birth injuries, and neonatal hypoglycemia, in addition to congenital anomalies and still births.[29] Further, the offsprings are potentially at a higher risk of developing childhood obesity later in life.[30] Women with GDM have higher rates of cesarean deliveries and pregnancy-induced hypertension.[31] and are at increased risk of future diabetes predominantly type 2 DM as are their children.[32] Compared to selective screening, universal screening for GDM detects more cases and

improves maternal and neonatal prognosis.[33,34] Diagnosis of GDM should be done as early as possible so that effective treatment can be initiated early.

Out of 300 subjects in our study, 25 were diagnosed as GDM with an incidence of 8.33%. Latest Indian study conducted by Rajput R et al reported an incidence of 7.1% respectively.[35] Seshiah V et al have found an incidence of 14.6% by IADPSG criteria and 13.4% by DIPSI criteria.[36] The above variations are may be due to geographical, ethnicity and racial variation.

Maternal outcome

In the present study HDP was to be significanty associated with GDM cases (p value 0.02). Pikee Saxena et al observed that the incidence of PIH is more in GDM group (40%) than non-GDM group (10%) which is quite more than the present study.[37] Abdulbari Bener et al also found that women with GDM were more likely to develop pregnancy induced hypertension (26.4%) in comparison to 14.1% of non-GDM women (P <0.001) which is slightly more than the present study.[38] There was a slight increase in incidence of caesarean section. According to a recent study in 2007, the rate of CS and induction of labour were increased in GDM mother.

Neonatal outcome

Mean birth weight obtained in present study in cases of GDM (3.05±0.47Kg) was higher than in women with non-GDM (2.65±0.43Kg). Incidence of macrosomia (≥ 4Kg) was 8% in GDM mothers. GDM was significantly associated with birth weight of ≥3Kg (p value <0.0001). Other neonatal complications like IUGR, meconium stained liquor and hypoglycemia were also proportionately more in GDM group than in non-GDM group.

In the present study apgar score of 1-3, 4-6 and 7-10 was seen in 0.73%, 4.03% and 95.24% of babies of non-GDM whereas in GDM it is 0%, 8% and 92% respectively which is not significantly associated (p value >0.05). 20% women belonging to GDM group had their babies admitted to NICU as compared to 17.65% women of the non-GDM group with ba HDP was to be significantly associated with GDM cases (p value 0.02). Bies requiring NICU admission which is not significantly associated (p value 0.76).

Higher perinatal mortality rate in uncontrolled gestational diabetes has been reported previously. However, among our diabetic patients, there was no perinatal mortality and no congenital malformation in the fetus.

A study in 2006 concluded that women with GDM who were diagnosed and treated following treatment guidelines demonstrated no severe maternal and neonatal complications. In the present study apgar score of 1-3, 4-6 and 7-10 was seen in 0.73%, 4.03% and 95.24% of babies of non-GDM whereas in GDM it is 0%, 8% and 92% respectively which is not significantly associated (p value > 0.05). Amongst 300 women, 53 women had their babies with some or the other complication leading to NICU admission. 20% women belonging to GDM group had their babies admitted to NICU as compared to 17.65% women of the non-GDM group with babies requiring NICU admission which is not significantly associated (p value 0.76).

CONCLUSION

Women with GDM are at an increased risk for adverse obstetrics and perinatal outcomes. Due to high prevalence of GDM in India early universal screening is essential. Screening for glucose intolerance during the early weeks of pregnancy is beneficial as this policy would help in identifying undiagnosed diabetes prior to conception and to render appropriate care. Screening and diagnosis of GDM with a single test procedure of 75g 2hr PGBS in a non-fasting woman i.e. following DIPSI guidelines is found to be effective, simple, economical and feasible.

The present study illustrates that the incidence of gestational diabetes in our community is 8.33%. Age > 30 years, up, past history of GDM and family history of DM, multigravida, past history of foetal loss and obesity are significant risk factors in GDM population. Compared to non-diabetics, gestational diabetics have higher maternal and neonatal complications. With the availability of early antenatal diagnosis of GDM and good antenatal and intranatal care maternal and perinatal outcome can be improved.

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