Indian Journal of Obstetrics and Gynecology Research 6 (2019) 350–353

Content available at: iponlinejournal.com

Indian Journal of Obstetrics and Gynecology Research

Journal homepage: www.innovativepublication.com

Original Research Article

Screening for gestational diabetes mellitus by 75 grams oral glucose tolerance test and its correlation with feto-maternal outcome: A prospective case controlled study

Prema Prabhudev[1], Surabhi Soni[1,*]

[1] *Dept. of Obstetrics and Gynaecology, SSIMS & RC, Karnataka, India*

ARTICLE INFO

Article history:
Received 27-02-2019
Accepted 10-07-2019
Available online 12-09-2019

Keywords:
OGTT
GDM
Macrosomia
Fetomaternal complications

ABSTRACT

Introduction: The prevalence of diabetes mellitus is increasing due to increasing urbanization, decreased level of physical activity and mostly due to increase in obesity. In pregnancy there are changes in the carbohydrate metabolism, leading to insulin resistance and thus, causing GDM.

Objectives: To determine the prevalence of GDM in pregnancy using 75gm OGTT in relation to feto-maternal outcome

Materials and Methods: Prospective case controlled study of pregnant women recruited at 24-28weeks gestational age. Following institutional ethical clearance, 204 consenting subjects were recruited consecutively and had standard OGTT done. Subjects with blood glucose level (BGL) done after 2hr with value of > 140mg/dL were considered GDM while values <140mg/dL were regarded as normal control. All patients were followed up till delivery to document the feto-maternal outcome

Result: Twenty six out of the 204 subjects have Blood glucose levels > 140mg/dl giving a prevalence of 12.74%.

Maternal complications in GDM and control group were Vaginal candidiasis (15.3%, 1.1%), symptomatic UTI (11.5%, 2.2%), PROM (23%, 3.9%), preterm labour (19.2, 5.6%), polyhydramnios (7.6, 0%), Pre-eclampsia (15.3%, 3.9%) respectively. F etal complications in GDM and control group like macrosomia (7.6%, 1.1%), congenital anomaly (7.6%, 2.2%), hyaline membrane disease (7.6%, 1.6%), hyperbilirubinemia (11.5%, 2.2%) respectively.

Conclusion: the result of our study is that GDM has many risk factors which include family history of diabetes mellitus, obesity, previous history of GDM, previous history of PCOS. It has been shown that incidence of pre-eclampsia, gestational hypertension, preterm delivery, operative interference, macrosomia, is higher in women with GDM. Early diagnosis of GDM in second trimester can reduce maternal and fetal complications.

1. Introduction

The prevalence of diabetes mellitus is increasing due to increasing urbanization, decreased level of physical activity and mostly due to increase in obesity. In pregnancy there are changes in the carbohydrate metabolism, leading to insulin resistance and thus, causing gestational diabetes mellitus. It includes the possibility that the glucose intolerance may have antedated the pregnancy.[1] Prevalence of GDM can range from 2-5% to as high as 14% in pregnant women, but it depends on the criteria used and the population described.[2] As pregnancy advances, there are secretion of various hormones from placenta which can increase secretion of insulin, but there is presence of insulin resistance also which in turn causes increase in blood glucose, when this compensation is inadequate gestational diabetes develops.[3] There are many complications associated with GDM which includes mother as well as fetal complications like Vaginal candidiasis, symptomatic UTI, PROM, preterm labour, polyhydramnios, Pre-eclampsia and fetal complications like macrosomia, congenital anomaly, hyaline membrane disease, hyperbilirubinemia.

* *Corresponding author*.
E-mail address: surabhisoni55@gmail.com (S. Soni).

https://doi.org/10.18231/j.ijogr.2019.076
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Early in the pregnancy, glucose crosses the placenta and reaches foetus by facilitated diffusion, resulting in the decrease in fasting blood glucose to 50-65mg%. But as pregnancy progresses due to placental hormones like oestrogen, progesterone and human placental lactogen, these hormones leads to post prandial hyperglycaemia due to its insulin antagonist action. There is increase in serum cortisol and human placenta containing enzymes (insulinase) which causes increases in the degradation of insulin, but the pancreas fail to respond adequately in GDM.[4]

2. Materials and Methods

2.1. *Data collection*

Antenatal patients with gestational age between 24-28 weeks (singleton pregnancy).

2.2. *Exclusion criteria*

Cases who are already diagnosed with diabetes mellitus, Gestational age other than 24-28 weeks, chronic medical conditions like chronic renal failure, liver diseases, HIV and other immune-compromised status, haemoglobinopathies and twins.

2.3. *Procedure*

204 pregnant women (gestational age between 24-28 weeks) were given 75-gram glucose orally and venous blood was drawn after 2 hours of intake of glucose solution, irrespective of their fasting status. According to the results, subjects were divided into 2 groups- GDM group with 2-hour blood glucose >=140mg/dl and control group with 2-hour blood glucose <140mg/dl. Follow up was done for feto-maternal complications like Vaginal candidiasis, symptomatic UTI, PROM, preterm labour, polyhydramnios, Pre-eclampsia and fetal complications like macrosomia, congenital anomaly, hyaline membrane disease, hyperbilirubinemia.

3. Result

1. Data was obtained by analysing $x2$ test using SPSS version 22. t-test was used to compare the means.
2. Twenty six out of the 204 subjects have Blood glucose levels > 140mg/dl giving a prevalence of 12.74%. Age group of 25-30 years showed highest incidence. Equal GDM occurrence of 8 were observed in Para 1 and Para 2 subjects
3. Only 3 cases were GDM in multiparous group (11.5%) whereas in control group maximum were primiparous i.e 62 out of 178 (34.8%).

GDM prevalence was higher in patients with BMI > 30.

Table 1: Showing distribution of subjects according to patient characteristics (Age, Parity)

	GDM	Control
Age(in years)		
<20	-	2(1.1%)
20-25	5(19.23%)	48(26.9%)
25-30	13(50%)	53(29.77%)
30-35	10(38%)	50(28%)
>35	3(11.5%)	20(11.2%)
Parity		
0	7(26.9%)	48(26.9%)
1	8(30.76%)	62(34.8%)
2	8(30.76%)	53(29.7%)
3	3(11.5%)	15(8.4%)

3.1. *Maternal complications in GDM group*

Were Vaginal candidiasis (15.3%, 1.1%), symptomatic UTI (11.5%, 2.2%), PROM (23%, 3.9%), preterm labour (19.2, 5.6%), polyhydramnios (7.6, 0%), Pre-eclampsia (15.3%, 3.9%) respectively. Most Statistically significant maternal complication in GDM group was UTI. PPROM was also found to be statistically significant complication of GDM group (p value=0.003). Out of diagnosed cases of GDM, 2 patients had polyhydramnios, whereas none of the patient in the control group had polyhydramnios.

3.2. *Fetal complication*

14 out of 26 (53.8%) cases of GDM had normal healthy babies whereas in control group 157 babies were healthy (88.2%). Neonate born to a diabetic mother had 6.4 time more chances of having weight more than 4 kg than non-diabetic mother. Fetus of diabetic mother had 3.42 times more chances of anomalies which is statistically significant. Babies of diabetic mother are 5.13 times more likely to develop hyaline membrane disease.

50% patients in GDM group delivered by cesarean section whereas in non GDM group 36.51% patients developed by cesarean section. 11 patients had vaginal delivery. 2 patients had ventouseassisted vaginal delivery (7.6%) for prolonged second stage of labour due to non-rotation of fetal head.

4. Discussion

Our study included 204 antenatal patients (between gestational age of 24-28 weeks) were subjected to OGTT using 75gm of glucose. These patients were followed to study their feto-maternal outcome. As pregnancy advances, there is increase in insulin resistance and diabetogenic stress due to increased insulin secretion caused by placental hormones.[5] When this compensation is inadequate gestational diabetes develops. Dahiya *et al* reported increased risk of developing preterm labour by 1.62

Table 2: Showing distribution of subjects according to BMI in both groups

BMI(kg/m2)	GDM	Control	Relative Risk	P value
<30	10(38.4%)	118(66.2%)	0.58	0.58
>30	16(61.5%)	60(33.7%)	1.8	0.0013

Table 3: Showing distribution of subjects according to Family history of diabetes in both groups

Family history of Diabetes	GDM	Control	Relative Risk	P value
Yes	16(61.5%)	17(9.5%)	6.44	0.0001
No	10(38.4%)	161(90.4%)	0.42	0.006

Table 4: Showing distribution of subjects in two groups according to maternal complications

Maternal complications	GDM	Control	Relative Risk	P Value
Vaginal candidiasis	4(15.3%)	2(1.1%)	13.84	0.018
Symptomatic UTI	3(11.5%)	4(2.2%)	5.13	0.02
PPROM	6(23%)	7(3.9%)	5.86	0.003
Preterm labour	5(19.2%)	10(5.6%)	3.46	0.014
Polyhydramnios	2(7.6%)	-	-	-
APH	2(7.6%)	8(4.4%)	1.71	0.48
Pre-eclampsia	4(15.3%)	7(3.9%)	3.91	0.029

Table 5: Showing distribution of subjects in two groups according to fetal complications

Fetal outcome	GDM	Control	Relative Rate	P value
Babies without complications	14(53.8%)	157(88.2%)	0.6	0.007
Macrosomia	2(7.6%)	2(1.1%)	6.486	0.04
IUD	2(7.6%)	3(1.6%)	4.56	0.087
Congenital anomaly	2(7.6%)	4(2.2%)	3.42	0.143

Table 6: Showing mode of delivery in two groups

Mode of delivery	GDM	Control	Relative Risk	P value
Vaginal delivery	11(42.3%)	102(57.3%)	0.78	0.220
Instrumental vaginal delivery	2(7.6%)	11(6.1%)	1.7	0.02
Cesarean delivery	13(50%)	65(36.61%)	2.1	0.018

times in their study. Kovilam O & colleagues have found out 20% risk of preterm labour in GDM pregnancies which were similar to our study as in our study risk of preterm labour was 19.2%. Dahiya *et al* reported 17.1% chances of polyhydramnios in their study, they reported 6 cases of polyhydramnios among the 35 diagnosed cases of GDM which is similar to our study as we reported 7.6% cases of polyhydramnios in GDM group. Prevalence of GDM and its risk in pregnancy, delivery and complications has increased, so screening is required to diagnose early. According to our results, we should adopt and follow a policy of universal screening for GDM in all antenatal clinics with 75 gm OGTT, because it has a high predictive value. This single step procedure which can be used as screening and diagnostic test for GDM. It is simple, economical and feasible.

5. Conclusion

To summarise, the result of our study is that GDM has many risk factors which include family history of diabetes mellitus, obesity, previous history of GDM, previous history of PCOS. It has been shown that incidence of pre-eclampsia, gestational hypertension, preterm delivery, operative interference, macrosomia, is higher in women with GDM. Early diagnosis of GDM in second trimester can reduce maternal and fetal complications.

6. Source of funding

None.

7. Conflict of interest

None.

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Author biography

Prema Prabhudev Professor and HOD

Surabhi Soni Post Graduate

Cite this article: Prabhudev P, Soni S. Screening for gestational diabetes mellitus by 75 grams oral glucose tolerance test and its correlation with feto-maternal outcome: A prospective case controlled study. *Indian J Obstet Gynecol Res* 2019;6(3):350-353.