

SCREENING FOR DIABETES IN PREGNANCYVidya Manoj Jadhav¹, Nitu Sinha²**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: AIM: All pregnant women are screened for gestational diabetes mellitus during pregnancy with timely intervention to reduce perinatal morbidity and obstetrics complication. **OBJECTIVES:** To determine the proportion of diabetes in ANC mother attending ANC OPD at Bharati Hospital, to evaluate the high risk factor causing abnormal GTT and to evaluate outcome of pregnant mother with GDM. **METHODS/STUDY DESIGN:** The prospective study was conducted in 100 pregnant women attending antenatal checkup who had no previous history of diabetes. ANC mothers were given 75gm glucose irrespective of last meal. A venous sample was collected at 2hr for estimating plasma glucose. Gestational Diabetes Mellitus was diagnosed if 2hrs. plasma glucose levels came >140mg/dl. **RESULT AND CONCLUSION:** The screening of pregnant woman for diabetes on their first visit to antenatal clinic can be an effective method in detection of diabetes during pregnancy. Though the higher incidence is found in the risk group women in comparison to non-risk group, universal screening can be recommended instead of selective screening. Early screening does help in early detection of diabetes. Chances of gestational diabetes are increasing with increase in age & gravidity. Increasing maternal carbohydrate intolerance in pregnant women is associated with a graded increase in adverse maternal and fetal outcome. Women diagnosed to have GDM are at increased risk of future diabetes predominantly type 2 DM as are their children. Thus GDM offers an important opportunity for the development, testing and implementation of clinical strategies for diabetes prevention and reducing perinatal morbidity and obstetrics complications.

INTRODUCTION: Pregnancy induces progressive changes in maternal carbohydrate metabolism. As pregnancy advances insulin resistance and diabetogenic stress due to placental hormones necessitate compensatory increase in insulin secretion. When this compensation is inadequate gestational diabetes develops. Gestational diabetes might better be termed as "Glucose intolerance during pregnancy. Gestational Diabetes Mellitus is defined as carbohydrate intolerance with the onset or first recognized during pregnancy with or without remission after the end of pregnancy." The importance of Gestational diabetes mellitus (GDM) is that two generations are at risk of developing diabetes in the future. Women with a history of GDM are at increased risk of future diabetes, predominated type 2 diabetes as are their children. Besides any abnormal glucose intolerance during pregnancy also has adverse fetal outcome.

All complication associated with GDM are potentially preventable with early recognition of GDM, intense monitoring and proper treatment. Moreover, in view of the high prevalence of diabetes Mellitus and its early onset among Indians, all pregnant women should be screened for GDM. Hence an appropriate screening for GDM has been much emphasized. Detecting the evidence of diabetes mellitus in pregnancy is a major challenge as the condition is associated with diverse range of adverse maternal and neonatal outcomes.

In Indian scenario, screening is essential in all pregnant women as Indians have 11-fold increased risk of developing glucose intolerance during pregnancy as compared with Caucasian

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women.^[1] Recent data suggests 16.55% prevalence of GDM in our country,^[2] hence universal screening during pregnancy has become important in our country.

AIMS & OBJECTIVES:

AIMS: All pregnant women are screened for Gestational Diabetes Mellitus during pregnancy with timely intervention to reduce prenatal morbidity and obstetrics complication.

OBJECTIVES:

- To determine the proportion of diabetes in ANC mother attending ANC OPD.
- To evaluate the high risk factor causing abnormal GTT.
- To evaluate the complication of pregnant mother with GDM and perinatal outcome.

MATERIALS AND METHODS: The study was a hospital based prospective analytical study. The present study was conducted in 100 pregnant women presented for Antenatal checkup in department of Obstetrics and Gynecology, Bharati Vidyapeeth Deemed University Medical College & Hospital located at Wanlesswadi, Sangli, Maharashtra. The pregnant women visiting ANC clinic between 24-28 Week's gestation and who have no history of diabetes diagnosed before pregnancy were selected for the present history. The study period was 1st Jan 2013 to 31st Dec. 2013. One hundred pregnant women were screened and were grouped in two groups according to presence or absence of the risk factors. Historical risk factors considered were, family history of diabetes, previous malformed baby, bad obstetric history like, previous unexplained still birth, recurrent abortions previous big baby and previous history of IUD. Risk factors taken into account were Hydramnios, Suspected big baby, Glycosuria and Obesity.

Exclusion Criteria:

- i. Diabetes Mellitus diagnosed before pregnancy.
- ii. History of intake of drugs that affect glucose metabolism like corticosteroids.

Procedure: "ANC mother at Bharati Hospital with written consent, were given a 75gm oral glucose load, irrespective of whether she was in the fasting or non-fasting state without regard to the time of the last meal. A venous blood sample was collected at 2hr for estimating plasma glucose. GDM was diagnosed if 2 hours plasma glucose was >140mg/dl. Each and every patient who had positive GCT were undergone OGTT. This test needs confirmation by a diagnostic and confirmatory oral glucose tolerance test and forms a part of two step technique for GDM Screening. These pregnant women were prospectively followed for maternal complication and perinatal outcome.

RESULTS & DISCUSSIONS: Screening & Diagnosis:

WHO Procedure: When a glucose tolerance test is administered to a non-pregnant individual, it is standard to use the 75-g, 2-hour OGTT. Using a different glucose challenge in pregnant versus non-pregnant persons leads to confusion in the laboratory and may result in errors in applying the proper diagnostic criteria.^[3] To standardize the diagnosis of GDM, the World Health Organization (WHO) recommends using a 2 hour 75gm OGTT with a threshold plasma glucose concentration of greater than 140mg/dl at 2 hours, similar to that of IGT (>140 &<199mg/dl), outside pregnancy.^[4]

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WHO procedure also has a shortcoming in that, the criteria suggested for diagnosis of GDM was also not based on the maternal and fetal outcome but probably the criteria was recommended for its easy adaptability in clinical practice.

Age in Years	Cases Screened	GCT Positive		OGTT Positive	
		No.	%	No.	%
<20	29	4	13.79	0	0.00
20-30	67	15	22.38	2	2.98
>30	4	2	50.0	1	25.0

Table 1: Case Distribution According to Maternal Age

Now in WHO procedure, in the antenatal clinic, a pregnant woman after undergoing preliminary clinical examination, has to be given a 75g oral glucose load, without regard to the time of the last meal. GDM is diagnosed if 2hr plasma glucose is ≥ 140 mg/dl.

Gravida	No. of Case	Positive GCT Case		Positive OGTT Case	
		No.	%	No.	%
1	13	2	15.38	0	0.0
2	51	10	19.60	0	0.0
3	22	4	18.18	1	4.54
4	7	2	28.57	0	0.0
5	5	2	40.0	1	20.0
6 and above	2	1	50.0	1	50.0

Table 2: Distribution According to Gravidity

Maternal Age: This table shows the case distribution according to maternal age. It is clear from the table that incidence was higher in the higher age group. Several authors have reported increasing frequency of gestational diabetes with increasing age (O'Sullivan J. et al., Mestman J. et al., Merkatz I. et al.) In Amankwah's study (1974),^[5] 67.6% of diabetics were at or above 25 years of age. Pyke (1971).^[6] proved that carbohydrate tolerance deteriorates progressively with age, especially in women.

Gravidity: This table shows gravidity distribution in the screened population. Incidence of positive GCT was found to be increasing with increasing gravidity. It was lowest in primigravidae. Percentage of positive OGTT was also found to be higher in multigravida women. It has been reported that increasing parity leads to a greater likelihood of diabetes developing in later life (Pyke 1956),^[7] and in this sense, pregnancy has been stated to be diabetogenic. As shown in table, incidence of diabetes was higher in those with higher gravidity. Our findings correlate with the finding of affaf Mohemmed et al. (1989),^[8] who also have noticed the same.

	Cases		GCT Positive		OGTT Positive	
	No.	%	No.	%	No.	%
Obese	3	3	2	66.6 %	1	33.3 %
Non-obese	97	97	19	19.5 %	2	2.06 %

Table 3: Distribution of Cases According to Presence of Obesity

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Obesity: This Table shows the distribution of cases according to presence or absence of obesity. Broch's formula was used to define obesity. Those women with weight more than 120 percent of their ideal weight were considered to be obese.^[9] Out of 100 pregnant women, only 3 were obese i.e. 3% of total population. This may be explained on the basis of poor socioeconomic class of the screened women. Out of these 3, 2 women showed positive GCT and one was diabetic. Thus the incidence of diabetes was quite higher (33.3%) in obese group as compared to nonobese (2.06%). Similar results were obtained by Affaf Mohemmed et al. (1989).^[8] who noticed higher incidence in those weighing more than 70 kg as compared to those less than 70kg.

Group	Number of Cases	Percentage
Group-I (With risk)	35	35 %
Group - II (Non-risk)	65	65 %
Total	100	100 %

Table 4: Distribution According to Risk Factor

DISTRIBUTION ACCORDING TO RISK FACTOR: This table shows that thirty five pregnant women were having one or more risk factors and sixty five women had no risk factor i.e. 35% of total population had a risk factor. Malhotra S. et al. (1988).^[10] have reported one pregnant woman in every 2.5, while Gilmer M. et al. (1980).^[9] have reported one in every 3 pregnant women had risk factor. Chen W. et al. (1972).^[11] have reported one women with risk factor in every 6 pregnant women.

Risk Factor (n = 35)	No. of Cases	%
1. Family H/o Diabetes	1	2.85 %
2. Previous Unexplained Stillbirth, Recurrent Abortion	10	28.57 %
3. H/o Previous Malformed Baby	1	2.85 %
4. Previous Big Baby	3	8.57 %
5. Previous H/o IUD	2	5.71 %

Table 5: Prevalence of Risk Factors in History

Prevalance of Risk Factor in History: Out of various historical risk factors, previous unexplained stillbirth, neonatal death, recurrent abortions were present in 28.57% of risk group 35 pregnant women. Past history of big baby is 8.57% and previous H/o IUD were present in 5.71% pregnant women. Family history of diabetes was present in 2.85% of such pregnant women and past history of malformed baby was present in 2.85% of such pregnant women.

Risk Factor (n=35)	No. of Cases	Percentage
Hydramnios	3	8.57 %
Glycosuria	10	28.57 %
Suspected Big Baby	2	5.71 %
Obesity	3	8.57 %

Table 6: Prevalence of Risk Factor

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Prevalance of Risk Factor: This table shows prevalence of risk factors in group one i.e. with risk group (n=35). Glycosuria was present in 10(28.57%) pregnant women. 10(28.57%) women had unexplained stillbirth and recurrent abortions. Three women were obese. 3(8.5% women had history of previous big baby while 2(5.71%) were having suspected big baby in this pregnancy. 3(8.5%) women, out 35 had hydramnios. History of previous malformed baby was there in one (2.85%) pregnant woman and 1(2.85%) had family history of diabetes. None of them had diagnosed gestational diabetes in their previous pregnancy.

Group	Positive GCT Cases		Positive OGTT Cases	
	No.	%	No.	%
Group I(Risk)(n=35 Cases)	8	22.8 %	2	5.7 %
Group II (Non-risk) (n=65 Cases)	13	20.0 %	1	1.5 %
Total (100 Cases)	21	21.0 %	3	3.0 %

Table 7: Incidence of Diabetes in Two Different Groups

Incidence of Diabetes: This table shows the patients with risk factor had the frequency of OGTT 5.71% as compared to 1.5% in patients without risk factor. In group I, out of 35 cases, 8 cases had GCT positive and out of them two was having abnormal OGTT. In group II, out of 65 cases, 13 had positive GCT while One of them proved to be diabetic in subsequent OGTT. Various authors have reported different percentage of incidences of diabetes in risk group and non-risk group. Our results in respect of pregnant women with risk factor is more or less similar to those of Malhotra S. et al. (1988).^[10] They have found 3.7% frequency of OGTT +ve in pregnant women with risk factors. With regard to results in respect of pregnant women without risk factor, it is more or less similar to those Lavin J. et al. (1981),^[12] which they have found frequency to be at 1.4%. The findings of current study as well as those of previous studies indicate that if the pregnant population is screened only on the basis of risk factors, a significant number of women with gestational diabetes and their off springs will be denied the benefits of this improved care.

Timing: As per Canadian Diabetes Association-2008 guideline recommendation, screening of all pregnant women should be between 24-28 weeks using GCT. As per WHO current recommendation, the screening test should be performed between 24 and 28 weeks of gestation, though there are reports that claim about 40% to 66% of women with GDM can be detected early during pregnancy.^{[13],[14]}

Analysis of Screening Test Results:

Plasma Glucose Mg/dl	Number of Cases
Up to -119	32
120 – 129	37
130 – 139	10
140 – 149	12
150 and more	9

Table 8: Distribution of Screened Population at Different Zones of Plasma Glucose Level

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Plasma Glucose Level: This table shows the distribution of screened population in different zones of plasma glucose level. Maximum number of women was having their screening test value in the zone of 120 to 129mg/dl. 38 women had the value in the zone of 119mg/dl and below, who were not tested further with OGTT. 51 had their screening test value in the zone of 120 to 139mg/dl and these were also not screened further because the cutoff point in our study was decided to be 140mg/dl of plasma glucose. We found 21 women, who had their screening test value 140mg/dl & above and these were

Plasma Glucose Mg/dl	No. of GCT	No. of OGTT	%
140 - 149	12	1	8.33
150 and above	9	2	22.2

Table 9: Correlation of Positive GCT With Positive OGTT at Different Zones of Plasma Glucose Level

CORELATIONT OF GCT+ WITH OGTT+: This table shows the correlation of positive GCT and positive OGTT at different zones of plasma glucose level. We found 1(8.33%) diabetic woman (positive OGTT) out of 12 women in the zone of 140-149mg/dl. In the zone of 150mg/dl and above, there were 09 women with positive GCT, out of them 2 had positive OGTT i.e. incidence was 16.66%. Thus, as the value of GCT increased, the chances of getting positive OGTT were also increased.

Author	Threshold of Plasma Glucose
O'Sullivan J. et al.	150mg/dl
Amankwah K. et al.	130mg/dl
Carpenter M. et al.	135mg/dl
Gillmer M. et al.	140mg/dl
Lavin J. et al.	150mg/dl
Malhotra S. et al.	150mg/dl
Our Study	140mg/dl

Various authors have used various thresholds for screening test. So it is clear from our study that decreasing the threshold though increases the number of OGTT, it increases the yield of positive cases and thus increases the sensitivity of the test.

Maternal Complication & Perinatal Outcome:

Risk Factor	No. of Cases	Percentage
Macrosomia	8	22.85 %
Congenital Anomalies	7	20.0 %
Hyperbilirubinemia.	6	17.14 %
RDS	2	5.71 %
Hypoglycemia,	1	2.85 %
hypocalcaemia,	1	2.85 %

Table 10: Distribution According to Perinatal Outcome

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Risk	No. of Case	Percentage
PIH	10	28.57 %
preterm delivery	2	5.71 %
Shoulder dystocia	1	2.85 %
Postpartum Hemorrhage	1	2.85 %

Table 11: Distribution According to Maternal Complication

The above tables in our study revealed 28.57% incidence of PIH, 22.85 % incidence of macrosomia, 20% incidence of congenital anomaly, and 5.71% incidence of preterm labor in GDM cases. In our study macrosomia was observed in 22.85% newborns of GDM mothers.

SUMMARY: One hundred randomly selected pregnant women were screened with 75gms GCT for detection of diabetes during pregnancy, irrespective of their last meal. 140mg/dl of plasma glucose was considered to be the cutoff point for the test. 35% of women had one or more risk factor for diabetes and amongst all risk factors, glycosuria & PIH were having maximum frequency i.e. 28.57% each of the high risk population. An abnormal GCT was found in 21(21%) pregnant women and 3(3%) women were detected to be diabetic, when further tested with 75gms 2 hours OGTT. The incidence of diabetes in our study population was 3.0% on average. It was 5.7% in high risk group and 1.5% in non-risk group. Maximum detection rate was found in the period of 24 to 28 weeks of gestation. With the increase in age and gravidity, chances of getting positive GCT and OGTT were found to be increased. There was higher incidence of abnormal GCT and OGTT in obese women compared to non-obese. Chances of getting an abnormal OGTT were found to be increased as the screening test value went in the higher zone of plasma glucose level. There is higher incidence of maternal complication of PIH as risk factor in the high risk group cases. In distribution of perinatal outcome, there is higher incidence of Macrosomia having 8 cases (22.8%).

CONCLUSION: Screening of all pregnant women for diabetes during the period 24 to 28 weeks can be an effective method in detection of diabetes during pregnancy. Incidence of GCT & OGTT is more in risk group. Though the higher incidence is found in the risk group women in comparison to nonrisk group, universal screening can be recommended instead of selective screening. Incidence of GDM is higher in the higher age group. Incidence of diabetes is progressively higher in the multigravidas. Incidence of diabetes is quite higher in the obesity. Incidence of positive OGTT were found to be increased as the screening test value went in the higher zone of plasma glucose level. Early screening does help in early detection of diabetes. GDM is associated with a variety of maternal complication and fetal outcome. The detection could be helpful to diagnose and subsequently monitor, during ANC period, and prompt interventions can prevent maternal complications and improve perinatal outcome.

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