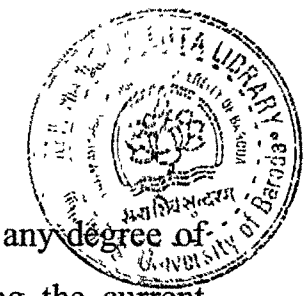
INTRODUCTION



INTRODUCTION

Gestational Diabetes Melitus (GDM) is defined as any degree of glucose intolerance with onset or any recognition during the current pregnancy. The definition applies regardless of whether insulin or diet modification is used for treatment or not the condition may persist after pregnancy.

It does not recognise the possibility that unrecognised glucose tolerance may have antedated or begun concomitantly with pregnancy.

=> Before the advent of insulin, few young diabetic women lived to childbearing age.

Before 1922, fewer than 100 successful pregnancy were reported in diabetic women, with a greater than 90% infant mortality rate and 30% maternal mortality rate.

In mid 1970s, the physicians were still counselling diabetic women to avoid pregnancy.

Improved infant mortality rate finally occurred when treatment strategies stressed better control of maternal plasma glucose levels.

PREVALENCE

According to American Diabetic Association, approximately 7% of all pregnancies are complicated by GDM, resulting in more than 2,00,000 cases annually. The prevalence may range from 1% to 14% of all pregnancies depending on the population studied and the diagnostic tests employed for detection.

Pregnancy with diabetes falls into two main groups, which are:

(1) Pregnancy in a woman who is having diabetes or known on treatment:

This contributes 0.1-0.5% of pregnancies. During last 20 years, perinatal outcome has improved remarkably in this high-risk group of patients. Except for the death due to major fetal malformation, the perinatal mortality rate for the women with diabetes who receive optimal care now approaches that of the general obstetric population.

(2) Gestational Diabetes, which is defined as carbohydrate intolerance of variable severity with its onset or first recognition during pregnancy.

=> The original method of screening for GDM was to take a personal and family history.

Patients who had family history of diabetes or a personal history of previous still birth, macrosomic offspring or adverse outcomes would then be counselled to undergo the diagnostic 100 gm 3 hr oral GTT.

A number of studies have demonstrated that taking such a history would identify only approximately 50% of women with GDM.

=> The optimal approach for screening and diagnosis is uncertain.

Expert panels in the United States recommend O'sullivan's glucose challenge test in which 50 gm of glucose is given to the patient regardless of a previous meal followed by 100 gm 3 hr oral GTT for women who screen positive on the GTT i.e. women with plasma glucose values >140 mg/dl.

The glucose challenge test as a screening method was first proposed by O'sullivan et al in 1973 and was found to have a sensitivity of 79% and specificity of 87% for detecting Gestational Diabetes as defined by criteria later adopted by National Diabetes Data Group.

Although current guidelines state that fasting is unnecessary before glucose challenge test. The results do vary with the length of time since the last meal or snack.

=> Other screening tests which includes random glucose values, glycosuria, fructose amine, diurnal glucose profile, etc. have been less extensively evaluated in pregnancy than O'sullivan test, which remains the gold standard.

=> The confirmational diagnostic test for Gestational Diabetes remains controversial. GDM is usually diagnosed on the basis of an oral glucose tolerance test. However, the exact load administered (50, 75 or 100 gm) varies between centres.

Epidemiologically the oral 75 gm glucose tolerance test has the advantage that it is internationally used outside pregnancy. However the diagnostic limits at which treatment is required still need to be defined.

This study conducted at the department of Medicine and department of Gynaecology, Medical Collage, Baroda was done to evaluate the NDDG screening criteria to identify prevalence of the GDM in our Indian population.

HISTORIC AND CLINICAL RISK FACTORS

Women with risk factors such as obesity, previous stillbirth, birth of a larger for gestational age (LGA) infant, history of a previous malformed baby, family history of diabetes or patients above the age of 35 years needed to be screened for gestational diabetes.

O'sullivan et al found that 37% of population had high risk factors, whereas among the patients with gestational diabetes only 53% had high risk factors.

The historic and clinical risk factors have a low sensitivity of only 63% and specificity of only 56%. They are therefore, insufficient and should not be used for the diagnosis of gestational diabetes.

National Diabetes Data Group (NDDG) changed the criteria of O'sullivan and Mahan in 1979. They have used plasma glucose oxidase method for measuring glucose concentration, instead of whole blood by Somogyi Nelson method of O'sullivan and Mahan, Carpenter and Coustan also have modified O'sullivan's criteria. O'sullivan's method has sensitivity of only 79% and specificity of only 83% and by NDDG, sensitivity is about 93% and specificity is 91%.

Criteria for different OGTT-mg/dl

	O'sullivan	NDDG	Carpenter	WHO
Fasting	90	≥105	95	≥140
1 hour	165	>190	180	
2 hour	145	165	155	≥200
3 hour	125	145	140	

ORAL GLUCOSE CHALLENGE TEST

The 50 gm 1-hour glucose challenge test has been widely studied by several authors. The test is done in absence of clinical indications. It is performed at 24-28 weeks of pregnancy, late enough for timely administration of 3-hour OGTT if indicated. It can be done on patients who are not starving. Blood is collected 1 hour after ingestion of 50 gm of glucose and the test is considered positive, if blood sugar is more than 130 mg/dl.

The 50 gm glucose tolerance test functions as a screening test, because a low screening test threshold of 130 mg/dl may be chosen so that sensitivity approaches 100% while specificity is maintained at near 80%.

SCREENING WITH RANDOM PLASMA GLUCOSE (RPG) SAMPLING:

Random plasma glucose sampling is simple, reliable and effective. However, subsequently sensitivity and specificity data were obtained which showed this to be poor method of screening.

All pregnant women were screened attending the antenatal clinic at N.Wadia Maternity Hospital, Mumbai. During the period, Nov-1987 to May-1990, 27504 women were screened. Blood samples were collected from all patients, irrespective of their last meal timings, at the time of their first antenatal visit. Their plasma glucose values were estimated within 3 hours of blood collection, using the glucose oxidase method. Of these, 514 women, with RPG levels above 100 mg% were subjected 2 hour OGTT using the WHO method (75 gm glucose load and fasting and 2 hour post glucose estimation of plasma glucose levels) during 28-32 weeks of gestation.

The findings were as follows:

RPG level	No. of women given RPG test	No. of women given OGTT	Positive OGTT
Less than 100 mg%	23,172		
101-120 mg%	3,265	422	13 (3.1%)
121-140 mg%	405	121	14 (11.6%)
141 mg% and above	232	21	13 (62%)

GLYCOSYLATED BLOOD PROTEINS:

Glycosylated hemoglobin and other blood proteins have been proposed as screening and diagnostic tests for GDM. A significant difference in glycohemoglobin levels between euglycemic patients with and without gestational diabetes has been demonstrated. Higher levels of glycohemoglobins are found in cases of impaired glucose tolerance and diabetic patients compared to normal. But glycohemoglobin level cannot be used for screening of GDM, as the specificity and sensitivity of the test is very low.

FRUCTOSAMINE ASSAY:

Fructosamine is associated with glycemic control over the previous 1-3 weeks possibly making it a more appropriate marker for gestational diabetes. However, its sensitivity is too low for it to be used as a screening method for GDM. The assay of fructosamine can be used for detecting cases of foetal hyperinsulinemia in women with GDM, and use of this assay may avoid amniocentesis.

CURRENT RECOMMENDATION FOR SCREENING FOR GESTATIONAL DIABETES:

It is recommended that all pregnant patients irrespective of clinical or risk factors and age, be screened at 24 weeks of gestation by a 50 gm glucose 1-hour post glucose challenge test or

by using RPG estimation. If the results of screening are normal, it should be repeated 32-34 weeks especially in obese patients, elderly patients and women with risk of GDM. If the results of screening are positive, 3-hour 100 gm OGTT should be carried out at 24-28 weeks, for early identification of GDM. If women have positive risk criteria, like previous GDM, pervious macrosomia or a malformed baby and are obese, they should be screened at the first antenatal visit, and if the screening test is negative, they should be screened at 24-28 weeks of the gestation.

PROBABLE PREGESTATIONAL DIABETES:

Timing of sample	**Serum or plama glucose**
After overnight fast	≥ 126 mg/dl (7.0 mmol/l)
Random	≥ 200 mg/dl (11.1 mmol/l)

AIMS IN MANAGEMENT:

(1) Normalization of maternal glucose level.

(2) Prevention of obstetric complications by good antenatal care.

(3) Early detection and prompt treatment of medical problems.

(4) Careful timing and appropriate mode of delivery.

(5) Intensive neonatal care.

(1) METABOLIC CONTROL:

For all types of diabetes in pregnancy, current approaches call for managing glucose levels to achieve and maintain near normal glucose level throughout pregnancy by diet and administration of short and intermediate acting insulin when required.

(2) DIET:

Current recommendation is 10-12 kg weight gain during second and third trimester or 350-400 gm per week.

Caloric requirements are increased by about 300 kcal per day above the basal requirement during pregnancy.

Obese patients should receive 25 kcal/kg bodyweight and non-obese 30-35 kcal/kg bodyweight daily.

Carbohydrates should constitute 40-60% of total calories and up to about 200 gm/day.

Proteins should constitute 20-30% of total diet and fats should be 25-40%.

Large amount of concentrated and refined sugars should be avoided as it will cause rapid perturbations of circulating glucose levels and maintainance of consistency from day to day to allow accurate assessment of metabolic control.

Presently the use of diet control is usually restricted to patients with normal values of fasting glucose in the OGTT.

(3) INSULIN TYPES:

Bovine insulin is more immunogenic than porcine. This is important during pregnancy because IgG-antibodies found in all insulin treated patients will cross the placenta, taking exogenous insulin with it. Therefore during pregnancy especially for GDM cases, pure insulin should be used either porcine or human. The added advantage of human insulin is improved maternal metabolic control. There are also antibodies binding to circulating insulin to cause variations in the levels of free insulin available for tissues.

(4) TREATMENT AIMED AT REDUCING PERINATAL MORTALITY (PNM):

A direct relationship has been demonstrated between the degree of maternal hyperglycemia and PNM rate.

Significant difference in PNM rates between diabetic individuals whose average whole blood glucose levels in third trimester measured four times daily in an inpatient setting were less than 100 mg/dl versus those with 100-150 mg/dl. The PNM rate was 4% in former group as compared to 50% in the latter.

American Diabetes Association recommended that fasting plasma glucose be maintained below 105 mg/dl and 2-hour postprandial values below 120 mg/dl for gestational patient, similar to the recommendations for pregnancies in women with pre-existing diabetes.