

Screening test for Gestational Diabetes

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Abstract

Three hundred pregnant women attending the antenatal out-patient clinic of TU Teaching Hospital between 24-28 weeks of gestation were screened for gestational diabetes using 50 g of oral glucose; venous blood plasma was drawn 1 hour later. Screening test value of ≥ 140 mg/dl was taken as cut off for performing the 3-hour diagnostic oral glucose tolerance test, OGTT.

Eleven [3.67%] pregnant women had their screening test value of ≥ 140 mg/dl and were again subjected to the 3-hour oral GTT, out of which two of the cases (0.66%) were diagnosed as diabetic.

Because of low prevalence of diabetes, we recommended only to screen women at high risk for gestational diabetes with 50 g oral glucose and a value of ≥ 140 mg/dl taken as cut off for performing the 3-hour oral GTT.

Keywords: GDM (gestational diabetes mellitus); GTT (Glucose Tolerance Test); Screening Test for diabetes.

Introduction

Gestational Diabetes Mellitus (GDM) is carbohydrate intolerance of variable severity with onset or first recognition in the present pregnancy and occurs in 1-3%¹ of pregnant women. It is typically a disorder of late gestation and is induced by pregnancy, perhaps, due to exaggerated physiological changes in glucose metabolism characterized by –

- a. Insulin resistance
- b. Hyper insulinemia
- c. Persisting fasting hypoglycemia
- d. Post prandial hypoglycemia

The main prenatal concern of GDM is foetal macrosomia (40%) accounting for shoulder dystocia (30%)² and immediate neonatal complications like hypoglycemia, hypocalcemia and hyperviscosity. Elevated fasting glucose level has also been associated with intrauterine death, stillbirth and early neonatal death.

Moreover, GDM may recur in subsequent pregnancies and there are chances to develop overt diabetes in later years in those women as well.

The risk factors for GDM according to American College of Obs/Gyn 1994 are:

- age over 30 yrs
- family history of diabetes
- prior macrosomia
- stillborn or malformed birth
- obesity
- hypertension
- glucosuria

Screening only the women with high risk factors as mentioned above, about 35-50% of the women of GDM would be missed.³ Hence there is substantial evidence in the medical literature

indicating that screening should be universal.

The 1990 Chicago Workshop Conference on GDM recommended that all pregnant women be screened (universal screening) using a 50g oral glucose tolerance test between 24 and 28 weeks without regards to time of day or last meal, and a plasma value at 1 hour exceeding 140 mg/dL be used as the cut off for performing the diagnostic 100 g 3-hour oral glucose tolerance test [Gestational diabetes is diagnosed when any two values are met or exceeded].

This system originally validated by O'sullivan & Co worker in Boston (1973) is undoubtedly the most sensitive (79%) and specific (87%). If screening in early pregnancy yields a normal report, subsequent screening should be performed at 30-34 weeks.

Diagnostic criteria

Glucose tolerance criteria for the diagnosis of GDM established by O'sullivan and Mahan in 1964 based on the 100 gm 3-hour glucose tolerance test performed after an overnight fast remain standard for diagnosing GDM when any two values are met or exceeded.

ACOG (1994) Criteria for Diagnosis of GDM using 100 G of Glucose taken orally

Time of measurement	Plasma Glucose (mg/dL)	
	National Diabetic Data Group (1979)	Carpenter & Coustan 1982
F	105	95
1 hr	190	180
2 hr	165	155
3 hr	145	140

If two or more values are abnormal, the patient has gestational diabetes. If only one value is abnormal, the patient cannot be diagnosed as having diabetes although she is at the risk for some complication such as macrosomia (18%) and pre-eclampsia is (7.3%).⁴ Patients with normal value in the 3-hour oral GTT with abnormal screening test still have a risk of these complications, 6.6% and 3.33% respectively and are at increased risk for macrosomia when compared to those who have normal screening values.⁵

These suggests that minimal alterations in maternal carbohydrate metabolism may have a significant impact on foetus and that patients with minimal alterations also require strict glycemic control to decrease the frequency of abnormal outcomes. About 15% of all pregnant women have an abnormal 1-hour screening test and 15% of these will be found to have gestational diabetes defined by at least two abnormal values using the 3-hour oral glucose tolerance test.

Methodology

Three hundred and thirty-six pregnant women attending antenatal clinic between 24-28 weeks of gestation were given appointment in group of 20, Friday at 10 am. They were not fasted. Glucose load of 50 gm was given orally and venous plasma-sample was drawn. Glucose analysis was done within 1-2 hours by Glucose oxidase (Enzyme) method. Reports were available the same day. Those women with the screening test value of ≥ 140 mg/dl were given appointment for the 3-hour oral GTT the subsequent Friday.

Instruction for GTT was, overnight fast for 14-16 hours, preferred on 200 gm of carbohydrate diet for preceding 3 days avoiding ambulatory at the time of test. Glucose load of 100 gm in 200-350 ml of water was taken over 5-15 minutes.

Observation & Results

Table I

Age group	<19	20-29	30-34	35
No.	63	206	31	0
%	20	68.6	10.33	0

Table II

Parity	Po	G2-G4	>G5
No.	144	154	4
%	48	50.67	1.33

Table III

High Risk Factor	No	%
Prev. Macrosomia	1	0.33
Prev. Congenital malformation	1	0.33
Prev IUGR	1	0.33
Obesity	2	0.66
Recurrent monilial infection	3	1.0
Recurrent UTI	5	1.66
Prev. neonatal death	9	2.97
Family history of diabetes	10	3.3
Prev still birth +IUD	11	3.6
Prev. Abortion	20	6.6
Poly hydramnios	0	
PIH	0	

Table IV: Screening test result: Range ST. 60 mg dl to 160 mg dl.

ST	<130 mg	130-134	135-139	>140
No.	286	3	0	11
%	95.33	1	0	3.66

Table V: Demographic Profile of II Cases of positive screening test.

Gravida	G1	G2	G3	G4	G5
No.	0	4	3	3	1
Age	<19	20-24	25-29	30-34	>35
No.	0	6	0	5	0

Table VI: 2 Cases of Abn GTT.

	F	Io	2o	3o
Case I	100	168*	148*	140*
Case II	93	220*	189*	143

Table VII

	Case I	Case II
Age	24	26
Gravida	G2	G3
Fam h/o of diabetes	?	?
High Risk Factor	0	abortion

Table VIII

Present Pregnancy

1. AGE>30

**2. *Obesity>200 Lbs maternal
wt>90 kg [15% of non
pregnant ideal weight]**

3. Chr HTN (hypertension)

**• Rec. UTI (Urinary tract
infection)**

• Rec. monilial vaginitis

**• * family history of
diabetes (first degree
relative)**

**• * Glycosuria - on >2
occasion (2nd specimen
after fasting)**

• Polyhydramnios

**• *CMF (Congenital mal-
formations)**

Past Obs. H. (prev history of)

**• Rec. Abortion (>3 spon.
abortion in 1st and 2nd
Trimester)**

• Preterm birth

**• * Previous baby weighing
4.5 kg**

**• * Previous Unexplained
IUD, Stillbirth or neonatal
death**

• CMF

**• Traumatic del. with
associated neurological
disorder**

• Diabetes

Observations and Results

This study done in TUTH, comprised 336 women, who attended the antenatal clinic of the out-patient department.

Three hundred cases were finally taken for data analysis as others were lost to follow. 68.6% women belonged to 20-29 years of age and 21% to 19 years and below. Age group 30-35 comprised 10.33%. Most of the women were multigravida forming 50.67% and primigravida forming 40%.

Family history of diabetes (3.33%), abortion (6.66%), previous stillbirth and IUD (3.66%), previous neonatal death (3%) were important risk factors in the study group. 286 cases (96.33%) had normal screening test value.

Eleven cases (3.67%) had screening test value of ≥ 140 mg/dl. This is comparatively less than the figure presumed by literature which is 10-15%.

High risk factors among 11 cases of significant Screening test value:

Abortion = 1

IUD = 2

These 11 cases on further testing with the 3-hour oral glucose tolerance test only 2 cases (18%) had abnormal GTT value.

Discussion

The 50 gm oral glucose is undoubtedly the gold standard by which other techniques must be judged when screening pregnant women in the population and it is a common practice to routinely screen pregnant women for GDM with 50 g oral GTT, with subsequent 3-hour 100 g oral GTT for those women whose 1-hour test is positive. This process can be both time consuming and inconvenient for patients. Additionally, its sensitivity and specificity are estimated to be 70% and 87% respectively and data about the effect of screening and treatment on low risk pregnancy are limited. Screening with a 1-hour 50 g oral GTT of only those women who have identifiable risk factors for GDM is a reasonable approach to identify the disease in low risk population⁶, as in those communities with a low prevalence of diabetes whose 50 g oral glucose screening test cannot be easily justified.⁷ The test that has gained popularity in Europe is based on random antenatal plasma glucose in early third trimester.⁸

A critical review of literature revealed that there is insufficient evidence to justify routine screening for GDM as the clinical focus is on intermediary findings like macrosomia with variable risk to shoulder dystocia and birth injury.⁹ While others feel that though precise methods of screening and diagnostic criteria for GDM continue to have little agreement, early recognition and management of GDM may, however, decrease macrosomia, thereby decreasing infant morbidity and mortality.¹⁰

Others recommend universal screening as screening only those with selected risk factors may result in 30-50% of women with GDM being overlooked and suggest all women at the initial booking be screened at 28 weeks for diabetes with random venous plasma glucose and cut off of 7.2 mmol/L for performing GTT.¹¹

Conclusion

We recommend screening only those women with a high risk factor (as given in table VIII especially the one's with asterix *) with the 1-hour 50 gm oral glucose screening test, which has withstood the test of time since 1973 as suggested by O'sullivan and Mahan, because of:

1. low prevalence of diabetes in our population.
2. negative screening test even in those with a high risk factor.

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