Routine Screening for Gestational Diabetes Mellitus with Glucose Challenge Test in Antenatal Patients

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Summary

The present study of screening for gestational diabetes mellitus was carried out in 800 consecutive women registering in our antenatal clinic prior to 28 weeks of gestation using, 50 gm glucose challenge test (GCT). The women were divided into two groups. Group 1 consisted of those with historical and clinical risk factors and group 2 of those without such risk factors. All the women were screened by using 50gm GCT, using glucometer, between 24-28 weeks of gestation. All the patients with positive GCT were subjected to 3 hours 100 gm oral glucose tolerance test (OGTT). Twenty four women (3%) were identified to have gestational diabetes, 16 belonged to group 1 and 8 to group 2. It was observed that screening by historical and clinical risk factors as well as ACOG protocol would have resulted in large number of patients going undiagnosed.

Universal screening of all pregnant women (not previously diabetic), between 24-28 weeks of gestation, using 50gm GCT, has been advocated by this study. This test when done with glucometer, requires no laboratory facilities, extra waiting period or trained manpower, has no side effects and guarantees good compliance of the patient.

Introduction

Gestational diabetes has been associated with fetal as well as neonatal morbidity and mortality. However with early diagnosis and treatment perinatal morbidity and mortality due to this disease could be the same as the general population. Traditionally, obstetricians have used glucose tolerance test (GTT) for the pregnant women who manifest certain historical risk factors. These include family history of diabetes, previous birth of large baby, previous adverse obstetric outcome etc. Although such screening by history appears to be a logical way to decide as to which pregnant woman be tested, it is apparent that these historical risk factors would be unlikely to detect gestational diabetes during first affected pregnancy and in women who may not be able to give accurate family history. If our goal is prevention of perinatal morbidity and mortality, it does not make sense to allow first adverse outcome to occur before looking for gestational diabetes.

Due to inadequacy of screening by historical risk factors many screening tests have been devised. Some have used random plasma glucose sampling, fasting blood sugar, fasting glycosylated haemoglobin and 50 gm glucose challenge test (GCT). The GCT, using glucometer has been used in this study for universal screening of antenatal patients in our out patients department.

Material and Methods

The study was carried out from Jan 96 to Dec 98, using 50gms glucose challenge test. Eight hundred women chosen for this study included those who reported for antenatal check-up before 28 weeks and those with either historical or clinical risk factors reporting after 28 weeks. Patients with already established diabetes were excluded from the study. Patients in this study were divided into two groups. Group 1 consisted of pregnant women who had the presence of one or more risk factors

Group 2 consisted of pregnant women without any risk factors. The risk factors were of two types historical and clinical. Historical risk factors included family history of diabetes, previous baby more than 4 kgs, history of unexplained still birth, polyhydramnios, congenitally malformed baby and recurrent abortions. The clinical risk factors for gestational diabetes were the presence of one or more of following factors complicating the present pregnancy viz obesity, glycosuria, recurrent monilial infection, polyhydramnios, recurrent folliculitis and IUGR.

Women in group 2 underwent screening using 50 gms glucose challenge test (GCT) between 24 and 28 weeks of gestation. Women with abnormal results were subjected to 100 gms oral glucose tolerance test (OGTT) for confirmation. Women in group 1 were subjected to screening at the time of booking in the antenatal clinic irrespective of the period of gestation and were retested at 24-28 weeks of gestation. Those found to have an abnormal GCT were subjected to OGTT.

Method of performing GCT – the screening test – This test was performed as a routine OPD procedure. Fasting was not a pre-requisite. Fifty grams glucose was dissolved in 200 ml of water and the patient was asked to drink it within 5 minutes. The time was noted and the patient was asked to come back after one hour for the test. Precisely one hour after oral glucose administration, a capillary blood specimen was obtained and tested for sugar levels by glucometer, using Haemo glucotest 20-800R strips manufactured by Boehringer Manheim. If the blood sugar values were greater than 140mg/ml (as per criteria laid down by second international workshop conference on gestational diabetes mellitus, 1985) the screening was considered positive and these patient were subjected to the 100gm 3hour OGTT to confirm the diagnosis of gestational diabetes.

Method of performing OGTT – Initial blood sample was taken after 10-16 hours of fasting and the patient was asked to drink within 5 minutes 100gm glucose dissolved in 200-400ml of water. Blood samples were then taken at the intervals of 60 minutes, 120 minutes and 180 minutes. The normal glucose values for OGTT in pregnancy as recommended by the second international workshop conference on gestational diabetes mellitus were – fasting 105mg/dl, 1 hour – 190mg/dl, 2 hours 165mg/dl, 3 hours 145/dl. A patient was considered to have gestational diabetes if two or more values were elevated.

Results

In this study the mean age of the patients was 24.7 years. Most of the women were less than 25 years of age (Table III). Among the historical risk factors, family history of diabetes was the most common risk factor, present in 52% of the cases (Table II). There were 10 patients who had clinical risk factors of gestational diabetes in addition to presence of historical risk factor. Out of 200 women in group1, 66 were found to have abnormal GCT. Sixty two of these were subjected to OGTT and 16 were found to have gestational diabetes. In group 2, 600 women were screened. Abnormal GCT was found in 134 women, 120 of them underwent OGTT and 8 were found to have gestational diabetes. Out of total 800 patients screened 200 had abnormal GCT and 24 had abnormal OGTT (Table-I). Among the 24 women who were

Table I : Age distribution of gestational diabetes patients

Age of women	Total no Of Women Screened	No of women group 1	gest diabetics found in group 1	No of women group 2	gest diabetics found in group 2
Up to 25 years	530	98	2	432	6
More than 25 to 30 years	222	78	10	144	2
Above 30 years	48	24	4	24	0

Table II: Yield of gestational diabetes from screening factors obtained by history

Risk Factors	No. of gestational diabetics	Percentage
Family history	8	50%
Baby weighing >4kgs	0	0
History of congenital abnormalities in baby	0	0
History of recurrent abortions	2	12.5%
History of unexplained stillbirth	2	12.5%
multiple risk factors	4	25%

Table III : Showing results of women in group 1 and 2 screened for gestational diabetes

Particulars	No of patients	group 1	group 2
No of women screening	800	200	600
No of women with abnormal GCT	200	66	134
No of women with abnormal GCT who got OGTT done	182	62	120
No of women with abnormal OGTT	24	16	8

diagnosed as gestational diabetes on the basis of OGTT, 18 (75%) had blood sugar levels between 140mg/dl and 169mg/dl. One third of gestational diabeties had no risk factors and were under 30 years of age (8 out of 24). Seventy five percent of the women under the age of 25 years having gestational diabeties were without any historical or clinical risk factors. Outcome of gestational diabetic pregnancy was good. There was no fetal loss, no congenital abnormalities, no birth asphyxia in any of the newborns. Two babies had macrosomia (>4kgs) and four had IUGR (<2.5kgs). Mean birth weight was 2.83 kgs. Sensitivity and specificity of screening only by risk factors alone was found to be 66.67% and 76.2% respectively and positive predictive value was 8%.

Discussion

The incidence of gestational diabetes varies between 3 to 12% depending upon the population sample and the diagnostic criteria (Carpenter 1982). Compared to European women, prevalence of gestational diabetes has increased eleven fold in women from the Indian subcontinent (Dornhurst 1992). In our study of 800 pregnant women, overall incidence of gestational diabetes was 3.07%. This figure is comparable to that of above workers. Among the Indian workers, Maheshwari et al (1989) and Kumar et al (1993) found the incidence of gestational diabetes to be 4.9% and 5.5% respectively.

Various aspects of patients medical history, family history and obstetric history have been advocated as a means of identifying, population at risk for gestational diabetes, deserving diagnostic testing. However historical and clinical risk factors have a low sensitivity for the disorder and are insufficient in selecting out the group at high risk for gestational diabetes. In contrast 50gm GCT was found to have higher sensitivity and specificity. (O'Sullivan et al, 1973).

In our study, group I consisted of 200 patients with historical or clinical risk factors. The incidence of gestational diabetes in this group was 8% (16 out of 200 cases). The number of gestational diabetics without risk factors were 8 out of 24 cases, therefore 33.33% cases would have been missed if only risk factors were taken as screening test for gestational diabetes (sensitivity 66%). Out of 16 patients with gestational diabetes with risk factors, 8 had family history of diabetes. Therefore, family history of diabetes constituted a major risk factor, which will be difficult to elicit in illiterate women, further reducing the efficacy of screening for gestational diabetes on the basis of risk factors. In this study 33.33% of the gestational diabetics with no risk factors were under 30 years of age. With ACOG recommendations on the population of 800 in this study, 8 out of 24 (33%) cases would have gone undiagnosed.

American College of Obstetricians & Gynaecologist (ACOG technical bulletin 1986) has recommended screening for gestational diabetes using 50gms/1hour GCT for all pregnant women aged 30 years or older and for women with risk factors. Coustan et al (1989) found that current ACOG recommendations resulted in sensitivity of only 65% and universal screening using a threshold of 140mg/dl at 24-28 weeks as recommended by Second International Workshop (Diabetes, 1985) had a sensitivity of 90%. Kim et al (1996) opined that 50gm GCT should be repeated in third trimester as it yields a large number of gestational diabetics. We confined our study to single screening test at 24-28 weeks as per current recommendations.

Higher perinatal mortality rate in uncontrolled gestational diabetics has been reported by O'Sullivan (1973). However among our diabetic patients there was no perinatal mortality and no congenital malformation in the fetus. Mean birth weight of the baby was 2.83 kg with no neonatal complications. This could be achieved with universal screening of all pregnant patients leading to early diagnosis, strict monitoring and management of these patients.

For our study the unit cost of each test was estimated but it did not include the overhead cost secretarial cost and physician interpetation cost. The cost per GCT worked out to Rs 18/-. The cost of 3 hours OGTT was Rs 70/- per test. Apart from the cost of the test convenience of the patient was another factor which made 50gm GCT used in this study acceptable to the patient. Once the lady was explained that the test involved waiting in the hospital only for one hour, during which she could get her antenatal check-up done, and only one blood

sample was needed, she was willing to undergo the test. Due to simplicity, acceptability, sensitivity and cost effectiveness of the procedure. GCT is recommended as a universal screening procedure for all pregnant patients at 24-28 weeks of pregnancy.

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