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CLINICAL GUIDELINES

Role of O'Sullivan's Test in Screening of Pregnant Women for Gestational Diabetes in Rural Area

[1]Neema Acharya, [2]Anil Inamdar, [3]Saunitra Inamdar

[1]Associate Professor, Department of Medicine, Datta Meghe Institute of Medical Science, Wardha, Maharashtra, India

[2]Associate Professor, Department of Obstetrics and Gynecology, Datta Meghe Institute of Medical Science, Wardha, Maharashtra, India

[3]Professor and Head, Department of Obstetrics and Gynecology, Datta Meghe Institute of Medical Science, Wardha, Maharashtra, India

Correspondence: Neema Acharya, Associate Professor, Department of Obstetrics and Gynecology, Datta Meghe Institute of Medical Sciences, Sawangi (M), Wardha-442004, Maharashtra, India, e-mail: neemadk@hotmail.com

ABSTRACT

Objective: To study the role of O'Sullivan's test in screening of pregnant women for gestational diabetes in rural area.

Materials and methods: A total of 1000 antenatal patients were screened for gestational diabetes with 50 gm glucose test (O'Sullivan's test), 1-hour plasma glucose value more than 130 gm/dl was considered screen positive who were subjected to 3-hour GTT.

Results: The incidence of gestational diabetes in our study was 0.5%, the maternal and fetal high-risk factors in these patients were PROM, hydromnios and birth weight more than 3.5 kg.

Conclusion: O'Sullivan's test is a cost-effective method of screening of diabetes in pregnancy which is associated with increased maternal and perinatal morbidity.

Keywords: O'Sullivan's test, Gestational diabetes, Glucose tolerance test, Macrosomia.

INTRODUCTION

Gestational diabetes is the most common metabolic disorder affecting carbohydrate homeostasis.[1] It appears at more than 20 weeks of gestation and disappears immediately or up to 6 weeks after delivery.[2] It is associated with high risk of fetal morbidity and mortality, and also leaves the mother at potential risk of developing overt diabetes at an advanced age. Increased risk of fetal compromise comes from maternal hyperglycemia, which leads to fetal hyperglycemia and fetal hyperinsulinemia. Fetal hyperinsulinemia accelerates fetal growth facilitated by rich pool of metabolic substrates in addition to glucose. In addition to tremendous fetal growth and organomegaly, hyperinsulinemia also leads to biochemical abnormalities like anaerobic glucose metabolizm, increased oxygen consumption, lactate production, fall in pH and oxygen tension. This gives rise to a variety of problems to the infant of diabetic mother like sudden intrauterine death, respiratory distress syndrome, hypoglycemia, cardiomyopathies, neonatal jaundice, impaired calcium and magnesium homeostasis, polycythemia and many more.[4] Mother may develop pre-eclampsia, hypoglycemia due to stringent blood sugar control necessary in pregnancy and diabetic ketoacidosis. In the long-term, she remains a potential candidate to develop type-II diabetes mellitus.

Detection and treatment of gestational diabetes mellitus (GDM) not only reduces and eliminates the risks for the fetus but also provides an opportunity to warn the mother to adopt preventive measures, like controlled diet, exercise and achieve ideal body weight, to halt or delay the process of onset of overt diabetes.[5]

Since, GDM is an asymptomatic disorder and needs some sort of screening tools for its detection, we endeavored to evaluate the applicability of 50 gm of oral glucose challenge test (O'Sullivan's test). This test has a sensitivity of 80%, specificity of 90% and positive predictive value of 85% which is superior to any other screening test.[7] Alternative screening protocols are based on blood include glycosylated hemoglobin (HbAlc) estimation and timed random blood glucose estimation.[8] Glycosylated hemoglobin estimation is costly and has low sensitivity. Timed random blood glucose estimation is relatively cheap and fairly specific but lacks sensitivity.[9] Our objective was to evaluate the effectiveness of screening by 50 gm oral glucose challenge test to detect the GDM and impaired glucose tolerance in pregnant women in rural set-up. Gestational diabetes is associated with significant fetal, neonatal morbidity and mortality. It is associated with significant perinatal morbidity and mortality. It is a definitive risk factor for the future development of type-II diabetes mellitus in the mother too. Our objective was to evaluate the effectiveness of screening by 50 gm oral glucose challenge test to detect the GDM and impaired glucose tolerance in pregnant women.

MATERIALS AND METHODS

This study was carried out at Acharya Vinoba Bhave Gramin Rugnalaya which caters to rural population of Wardha district of Maharashtra. The ethical committee of the hospital had given permission to carry out this study. Patients were included in the study from a broad obstetric population regardless of presence or absence of classical gestational diabetes risk factors, like

maternal advanced age, parity, obesity, recurrent pregnancy loss, congenital malformations, intrauterine death, polyhydramnios, prolonged difficult labor, operative deliveries associated with heavier neonates, still births, neonatal deaths and family history of diabetes.

A total of 1000 pregnant women attending antenatal clinic in outdoors department of obstetrics and gynecology were tested between 24 and 36 weeks of gestation. All these women were counseled and booked before enrolling them in the study. They were explained about the risk of GDM and importance of its detection and treatment. After taking patient's consent, they were given 50 gm oral glucose load in the form of simple galaxose-D (Glaxo-Co) dissolved in 250 ml of clean tap water preferably in the state of fasting.[6] Eight patients out of the entire study expressed unpleasantness to the taste of solution.

Data was recorded in a proforma including patient's age, height, weight, gestational age, detailed menstrual, obstetric and medical history. Record of blood pressure, general, systemic and obstetric examinations were also included. According to the standard height, weight and body mass index tables, women with < 80% of ideal weight were regarded as underweight. Those with weight between 80 and 120% were normal, women with > 120% were moderately obese and those with > 150% were severely obese. A sample of blood drawn one hour after glucose ingestion was sent to the laboratory for blood glucose estimation by glucose oxidase hexokinase method. A blood glucose level of 130 mg/dl was taken as cut off value for further evaluation of the patient by 100 gm oral glucose tolerance test (OGTT) and confirmation of the diagnosis of GDM or impaired glucose tolerance (IGT). Before the OGTT patients were advised to avoid rich carbohydrate diet for at least 3 days and present at the morning of the test with an overnight 12 hours fast. Patients who had two or more abnormal glucose values equal to or exceeding the defined National diabetes data group criteria were labeled to have gestational diabetes and those with only one abnormal value impaired glucose tolerance. Patients who were screened positive before 28 weeks but OGTT negative or screened negative, but had historic high-risk factors for GDM were rescreened at 28 weeks. The rescreened positive were subjected to repeat OGTT and those with positive results were reclassified to have GDM or IGT according to the report while rest were declared normal and followed in low risk antenatal clinic. Those diagnosed to have GDM or IGT were followed in high-risk clinic for maternal blood glucose control in normal range of 80 to 120 mg/dl by diet alone, diet and exercise or insulin therapy and for strict fetal monitoring throughout the pregnancy. Mothers were watched for the development of complications like urinary and genital tract infection and pre-eclampsia. Fetal monitoring was done by fetal kick count record, serial ultrasound scans for fetal growth, biophysical profile and amniotic fluid volume. Timing and mode of delivery of the patient was decided according to set protocols for diabetic mothers.

The detailed description of their follow-up till the delivery and sixth week of puerperium is beyond the scope of study and is not included here.

RESULTS

Out of 1000 cases tested, eight cases were found to have screen positive. As shown in Table 1, out of those three were negative for 3 hours GTT, five were positive for gestational dibetes. None of the cases were positive for type-II diabetes mellitus. Hence, incidence of GDM was 0.5%. As shown in Table 2, majority of cases were found to be screen-positive in age group more than 30 years. Table 3 depicts, three cases were screen-positive but negative for 3 hours GTT. The significant obstetric findings in these three patients were: Hydramnios (1 case), multiple pregnancy (1 case), EFW (estimated fetal weight) > 3.5 kg (lease). Out of five gestational diabetes patients two had hydramnios, two had EFW (> 3.5 kg), l had PROM. Cases found negative at 24 were rescreened at 28 weeks and were found to be negative. Dignosed cases of gestational diabetes were managed with diabetic diet and insulin.

Table 1 Percentage of screen-positive patients

Results	*Total cases*	*Screen positive*		*Screen negative*		*GDM Two abnormal values on OGTT*	
		No.	*%*	*No.*	*%*	*No.*	*%*
No. of cases	1000	8	0.8	994	99.2	5	0.5

Table 2 Patients' characteristics

Age	*No. of cases*	*GDM*	*%*	*> 130 mg%*
19 or less	6	Nil	Nil	Nil
20-30 years	960	Nil	Nil	3
> 30 years	34	Nil	Nil	5
Total	1000	Nil	Nil	8

Table 3 Risk factors associated in screen-positive

Risk factor	*No. of cases in screen-positive but 3 GTT negative*	*No. of cases in GDM*
Hydramnios	1	2
EFW (USG) > 3.5 kg	1	2
PROM	Nil	1
Multiple pregnancy	1	Nil

DISCUSSION

In our study, out of 1000 patients, eight were screened positive in contrast to 60 to 63 per 1000 in most world series. Similarly, diabetes complicates 3 to 4 per 1000 pregnancies in most world series, but where intensive screening has become part of routine antenatal care; more cases are being detected with a range of 1 to 12 per 1000 obstetric cases. However, it varies among different populations of different geographical origins and ethnic backgrounds.[10,11]

In our study, incidence was 0.5% for GDM while for impaired screening test it was 0.8%. The disorders of glucose intolerance are regarded as diseases of developing countries.[12]

Some of the local factors contributing to this high incidence are poverty and ignorance. People are usually not aware of nutritional and caloric values of food and implications on body weight and health. Carbohydrate based food is cheap and taken as staple diet whereas fats are used to add the taste of the food. Moreover, lack of awareness regarding weight control puts them in the habit of excessive eating. The situation is further accentuated during pregnancy, where the women are customarily advised to take the food for 'two'. This leads to obesity, and unfortunately this is taken as a sign of beauty and health in most of population. These facts put our population at higher risk for the development of diabetes, and the importance of intensive screening for the detection of preclinical disease cannot be overestimated.[11,12,14] Such high-risk factors were present in obstetric histories of most of our patients diagnosed to have GD screening system, is the system originally proposed by O'Sullivan. He suggested that single OGCT is not reliable; rescreening must be done in patients after 28 weeks of gestation who had historic risk factors present.[13,15,16] In our study, the cases which were found screen-positive at 24 weeks were again screen positive in rescreening at 28 weeks. The screen-positive patients had blood glucose level >130 mg/dl, but their 3 hours GTT was found to be normal. Table 4 shows that among eight screen-positive women, six had high body mass index. The significant obstetric findings in these four cases were hydramnios (l case), baby weight > 3.5 kg (1 case), multiple pregnancy (lease) as shown in Table 3. The incidence of GDM in our study population is almost 0.5%, which is significant for a rural population and has malnourishment.

Table 4 Body mass index characteristics of screen-positive patients

Body mass index	*Low (19-23)*	*High (> 26)*
No. of screen positive	2	6

CONCLUSIONS

The 50 gm glucose challenge test should be used as a screening method for detecting impaired glucose tolerance or gestational diabetes mellitus. Though the incidence in our study population is 0.8% where there were definite significant obstetric findings in screen-positive cases also. The incidence in our study was significant inspite low body mass index of women. False-positive screening was avoided in this study by doing the test in fasting state.

It is cost-effective method of screening diabetes in pregnancy which is associated with increased maternal and perinatal morbidity. It should be included in routine antenatal screening methods.

Our results suggest that a policy of universal screening for GDM should be adopted in all antenatal clinics and 50 gm OGCT (O'Sullivan's test) is a test with a high predictive value besides being a very economic. It will not only improve the perinatal outcome but also enable us to identify women at risk of developing diabetes in future. These potential diabetic women can be warned for future happening and advised to adopt preventive measures to halt or delay that process. This will in turn shed load from health care resources responsible to take care of diabetic patients in the long run.

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