

Battling with Rising Prevalence of Gestational Diabetes Mellitus: Screening and Diagnosis

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ABSTRACT

Introduction: Gestational diabetes affects 2 to 4% of all pregnancies, with an increased risk of developing diabetes for both the mother and the child. The prevalence of gestational diabetes mellitus (GDM) in India varied from 3.8 to 21% with the geographical locations and diagnostic methods used.

Objective: To study the differences in the type of tests and timing of tests; failure to screen and diagnose; this could explain the varying prevalence reported from different centers indicating that there could be an underestimation due to missed diagnosis.

Materials and methods: A 15-question online survey (www.abcofobg.com) was developed to assess providers' knowledge; practices and attitudes related to the screening and management of GDM. All data were entered into an electronic database without personal identifiers, to maintain confidentiality. The data was analyzed by using SPSS version 16.0.

Results: A total of 584 respondents were participated in the survey. Overall, 82.14% of doctors screened all their antenatal patients for GDM. A total of 65.48% of them ordered for a blood glucose test during first antenatal visit even in first trimester. During screening, 39.29% of doctors preferred 50 gm glucose challenge test and 26.19% of doctors preferred 75 gm glucose and 2-hour reading. When the test was positive, 47.62% of doctors ordered for 100 gm oral glucose tolerance test (OGTT) and 38.1% for 75 gm OGTT. A total of 40.48% of doctors used C and C criteria, 26.4 % used National Diabetes Data Group (NDDG) criteria and 32.14% took 140 at 2 hours for 75 gm OGTT criteria of cutoff to diagnose the GDM.

Conclusion: Preventive measures against type 2 diabetes (T2DM) should start with proper screening and diagnosis during pregnancy. Many tests with varied criteria are in use. There is an urgent need to institute uniform standards for the timing and type of tests done for identifying the cases of GDM. This is crucial to reduce the burden of T2DM in India for now and for generations to come.

Keywords: Universal screening for GDM, Repeat testing, C and C, OGTT, Burden of T2DM.

INTRODUCTION

Diabetes mellitus, a known chronic illness has become a major health problem worldwide. According to the World Health Organization, diabetes has emerged as an epidemic affecting 246 million people across the world. Among these, almost 80% burden is in developing countries.¹ Extrademands on the pancreas cause some women to develop diabetes during pregnancy. Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy.²

Gestational diabetes affects 2 to 4% of all pregnancies, with an increased risk of developing diabetes for both the mother and the child. The risk of type 2 diabetes mellitus (T2DM) returning is greater if the mother has given birth to a baby that weighed over 4 kg (9 lbs) at birth. Gestational diabetes is associated with increased perinatal morbidity with overt diabetes (macrosomia, neonatal hypoglycemia, hyperbilirubinemia,

respiratory distress syndrome) in infants and mother.³ In babies, GDM can append an intrauterine environmental risk factor to the increased genetic risk for the development of obesity and diabetes.⁴⁻⁶ In 49.9% mothers with up to 28 years' follow-up, GDM can be a very strong risk factor for the development of permanent diabetes later in life. Timely screening of all pregnant women for glucose intolerance would help to achieve euglycemia and would prevent the vicious cycle of transmitting glucose intolerance from one generation to the next.⁷ Thus, GDM recommends an important prospect for the development, testing and implementation of clinical strategies for diabetes prevention.⁸

The prevalence of GDM in India varied from 3.8 to 21% with the geographical locations and diagnostic methods used. Gestational diabetes is more prevalent in urban areas than in rural areas.^{3,4,9-13} Within the population and the ethnicity, the prevalence of GDM corresponds to the prevalence of impaired glucose tolerances.⁵ This study was conducted to assess knowledge among physicians regarding the screening and diagnosis of GDM—to study the differences in the type of tests and timing of tests; failure to screen and diagnose; this could explain the varying prevalence reported from different

Date of Received: 04-10-11

Date of Acceptance: 13-10-11

Date of Publication: September 2011

centers—indicating that there could be an underestimation due to missed diagnosis.

MATERIALS AND METHODS

A 15-question online survey (www.abcofobg.com) was developed to assess providers' knowledge, practices and attitudes related to the screening and management of GDM. The final sample consisted of 584 respondents. The questionnaire included fifteen questions altogether related to universal/ selective screening, timing of screening/method of screening and diagnosis and the perceived prevalence in each center, attitude toward subsequent management. All data were entered into an electronic database without personal identifiers, to maintain confidentiality. The data was analyzed by using SPSS version 16.0.

RESULTS

A total of 584 respondents were participated in the survey.

Screening and Diagnosis

Table 1 shows the variables related to screening of GDM.

Universal vs Selective Screening

Overall, 82.14% of doctors screened all their antenatal patients for GDM.

Timing of Screening

Around 65.48% of them ordered for a blood glucose test during first antenatal visit even in first trimester. Even when the test was normal during first visit, 97.62% of doctors would still repeat the test between 24 and 28 weeks (Fig. 1).

Method of Screening

During screening, 39.29% of doctors preferred 50 gm glucose challenge test and 26.19% of doctors preferred 75 gm glucose and 2 hours reading. The rest used random readings.

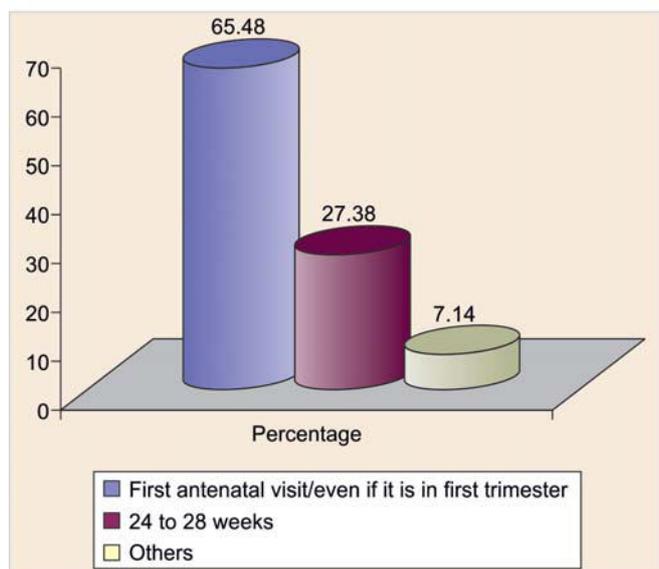


Fig. 1: Time of screening

Method of Diagnosis

When the test was positive, tests used for definitive diagnosis were:

- Around 47.62% of doctors ordered for 100 gm oral glucose tolerance test (OGTT)
- Around 38.1% for 75 gm OGTT (Fig. 2)
- Around 40.48% took 95, 180, 155 and 140 (C and C criteria) as cutoff
- Around 26.4% applied 105, 195, 165 and 145 (NDDG criteria) for cutoff
- Around 32.14% took 140 at 2 hours for 75 gm OGTT criteria of cutoff to diagnose the GDM (Fig. 3)
- When only one reading appeared abnormal, 54.76% of the doctors repeated the test every trimester and 69.1% of doctors referred all abnormal OGTT patients to a specialist (Fig. 4).

Perceived Prevalence

Overall, 1 to 5% of incidence was reported by 60.71%, 5 to 10% prevalence was reported by 17.86% and only < 20% reported a prevalence of 10 to 20% (Fig. 5).

Subsequent Management

As many as 70% of the clinician's would refer them to specialists (physicians or endocrinologists).

DISCUSSION

This study aimed to assess knowledge of doctors about screening and diagnosis of GDM and reflects on the need for uniformity in the methodologies for the same.

Universal Screening for Indian Pregnant Population

There were 82% of the clinicians offering screening tests to all antenatal women.

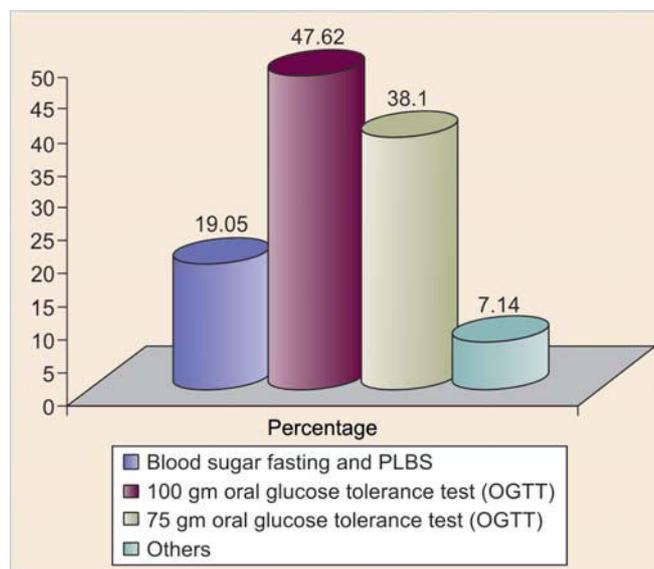


Fig. 2: Type of screening, if positive

There was much debate about the more appropriate, universal or selective screening of pregnant women for GDM.¹⁴⁻¹⁶ According to Moses and Colagiuri, between 1991 and 1994, 50% of pregnant women in Australia's most populous state, New South Wales were not screened for gestational diabetes.¹⁷ Compared to selective screening, universal screening for GDM detects more cases and improves maternal and neonatal prognosis.^{18,19} It is generally accepted that women of Asian origin and especially ethnic Indians, are at a higher risk of developing GDM and subsequent T2DM.²⁰⁻²² Hence universal screening for GDM is essential in India.

From the results of the study, only 82% of the clinicians were offering screening tests to all antenatal women. We need

to make sure that the rest of the 18% of clinicians should also follow universal testing as a standard protocol in order to minimize the possibility of missing the diagnosis (Table 1).

Method of Screening

Though there are no uniform international criteria for the diagnosis of GDM, the most commonly used criteria are those of O'Sullivan and Mahan²³ and the World Health Organization (WHO).²⁴ The existence of different methods of performing glucose tolerance tests has also hindered the development of uniform diagnostic criteria for GDM.

In our study, 39.29% of doctors preferred 50 gm glucose challenge test and 26.19% of doctors preferred 75 gm glucose

Table 1: Awareness on screening and diagnosis of GDM

Awareness on screening of GDM	N = 584	%
1. Screen the following for gestational diabetes		
• All my antenatal patients	480	82.14
• Only high-risk antenatal patients based on medical history, BMI and family history	97	16.67
• Only if they develop signs suggesting GDM during antenatal	7	1.19
• Do not screen any antenatal patient for diabetes	0	0
2. During antenatal I order a blood glucose test at		
• First antenatal visit/even if it is in first trimester	382	65.48
• 24 to 28 weeks	160	27.38
• Only if urine shows sugar	0	0
• Others	42	7.14
3. If on the first visit, sugar is normal, I would still repeat between 24 and 28 weeks<		
• Yes	570	97.62
• No	14	2.38
4. I do the following tests as the screening test (if different tests done at different trimester—please specify)		
• Only urine sugar	21	3.57
• Fasting blood sugar	83	14.29
• Postprandial blood sugar	69	11.9
• Fasting and PP	83	14.29
• Random blood sugar	83	14.29
• 50 gm glucose challenge test	229	39.29
• 75 gm glucose and 2 hours reading	153	26.19
• Oral glucose challenge test	63	10.71
• Others	49	8.33
5. The incidence of getting an abnormal reading with the screen test in my practice is approximately:		
• 1-5% 355	60.71	
• 5-10%	104	17.86
• 10-15%	49	8.33
• 15-20%	63	10.71
• More than 20%	14	2.38
6. Once screen positive I order a		
• Blood sugar fasting and PLBS	111	19.05
• 100 gm OGTT	278	47.62
• 75 gm OGTT	223	38.1
• Others	42	7.14
7. What criteria of cutoff do you use to diagnose GDM?		
• 95,180,155,140 (C and C criteria)	236	40.48
• 105, 195, 165, 145 (NDDG criteria)	152	26.1
• 140 at 2 hours for 75 OGTT	188	32.14
• Others	7	1.19
• If only one reading is abnormal I would		
– repeat the test every trimester,	320	54.76
– repeat PLBS every month,	223	38.1
– consider the test normal	42	7.14
8. For all abnormal OGTT patients		
• I refer them to a specialist for management	404	69.1
• I advice diet control only	98	16.7
• I would put them on insulin myself	77	13.1
• I would start oral hypoglycemic agents	7	1.19
• I would put on insulin only if fetus shows macrosomic changes	0	0

and 2 hours reading. Overall, 65% of the doctors were applying one or the other standard practices for screening. But, the remaining 35% who were resorting to a random sugar testing.

Just a fasting or postprandial test without using the glucose challenge would miss the diagnosis in many who would actually be glucose intolerant (Fig. 1). This is a lost opportunity for early diagnosis and care. The importance of following the screen

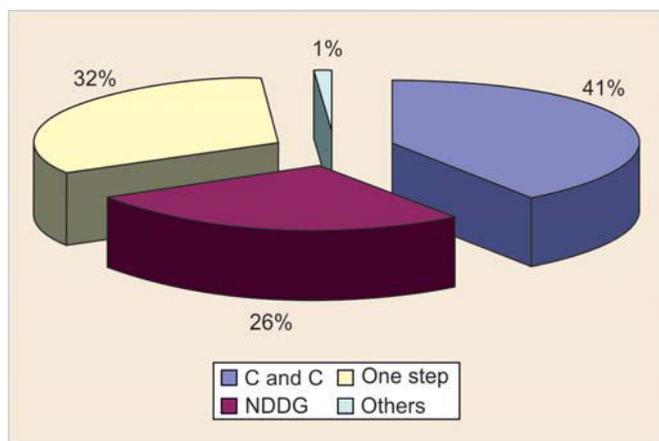


Fig. 3: Cutoff values used by practitioners

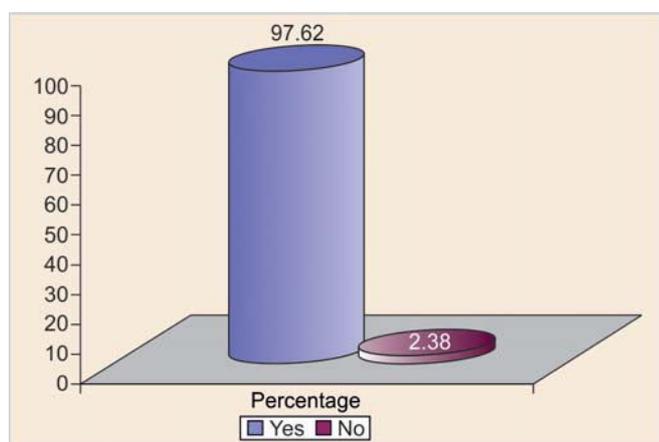


Fig. 4: Repeat screening

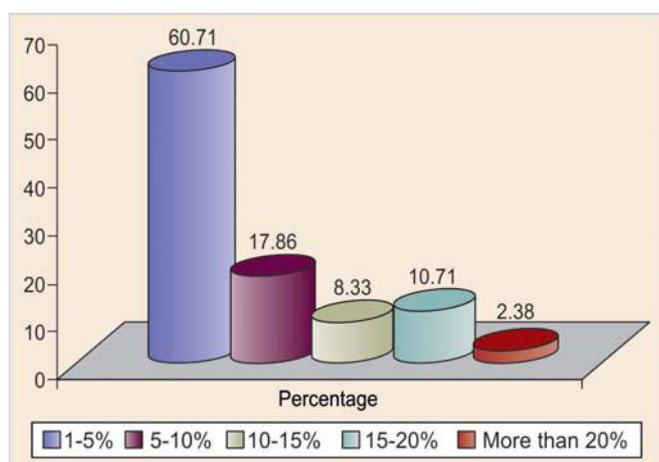


Fig. 5: Incidence of getting an abnormal reading with the screen test

positive patients and subjecting them to a definitive diagnostic test (OGTT) is also to be emphasized.

Nonperformance of Standard Tests by >35% of Practitioners

The standard two step test involves a screening test (GCT) and a diagnostic test (OGTT). For the diagnostic test on women who are screen positive, most practitioners were not able to offer the diagnostic test with fasting sample and three more venous samples on an hourly basis after challenge with 100 gm glucose. A pregnant woman visiting the antenatal clinic for the first time does not come in the fasting state. If she asked to come on another day in the fasting state she may not return. And, many women were not compliant with four samples of blood being drawn with more than three hours of waiting. Inability to perform these tests on a large number of women would certainly miss many cases of glucose intolerance and GDM and the clinicians remain complacent and perceived prevalence in many parts of India are as low as 1 to 2%. Having the tests been performed in the prescribed manner, many more cases would have come to light and true prevalence of over 15% would have been documented. This needs a serious thinking on an alternative cost-effective doable test in the Indian context, where the limitations of repeat visit in the fasting state and multiple blood samples could be circumvented.

Criteria for Cutoffs at OGTT

- Around 40.48% took 95, 180, 155, 140 (C and C criteria) as cutoff
- Around 26.4% applied 105, 195, 165, 145 (NDDG criteria) for cutoff (Table 1).

This difference in the cutoff values used, would give different prevalence rates for the same set of tested women. This adds to further confusion, even in the centers that are able to perform the OGTT. It is recommended that a stricter criterion like C and C is used on Indian pregnant women, in order not to miss any cases.

Repeat Testing

According to the guideline,²⁵ when the test was normal during first visit, 97.62% of doctors would still repeat the test between 24 and 28 weeks (Table 1). This is indeed a good practice.

Innovative Alternatives

The recent publication by Anjalaxi et al²⁶ highlights an alternative innovative test which is equally efficacious in diagnosing GDM. Many centers have recently taken to perform a One Step test—a single-step procedure giving 75 gm oral glucose load without regard to the time of the last meal. A venous blood sample is collected at 2 hours for estimating plasma glucose by the GOD-POD method.²⁷ Gestational diabetes is diagnosed if 2 hours plasma glucose is ≥ 140 mg/dl serves both as screening and diagnostic test for GDM, which is simple, economical and feasible.²⁶ This test does not

mandate a fasting state and can easily be performed on all antenatal women as a one visit one sample one step test—for screening and diagnosis. This may be the way forward in the Indian context.

CONCLUSION

Preventive measures against T2DM should start with proper screening and diagnosis during pregnancy, so that the GDM patients can be counseled on lifestyle and diet measures. This will be critical to achieve a control over the new epidemic of T2DM in India, at a relatively lower age. If diagnosed as GDM, and glycemic control achieved, the fetus in uterus will be programmed in a normoglycemic environment. This will reduce the burden of childhood obesity and T2DM in adulthood in these children born out of well-controlled GDM mothers. These implications for generation next emphasize the need for universal screening and diagnosis of every single Indian pregnant woman using a cost-effective and an operationally feasible test. This is a vital public health measure. The authors recommend a massive awareness program for all fellow practitioners to highlight these long-term implications of GDM; they could make a choice of standard two step testing where feasible but may chose the simple one step test in a vast majority of situations where patient follow-up and repeated sample collections form a real stumbling block to detect the true prevalence.

This would ensure that every pregnant woman in India is under the scanner of the screening and diagnostic tests for GDM.

ACKNOWLEDGMENTS

We extend our sincere thanks to Ravishankar and Dr Peter Pothula, BioQuest for their valuable IT and editorial guidance in the generation of this report.

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