



**ORIGINAL RESEARCH PAPER**

**Diabetology**

**COMPARISON OF ORAL GLUCOSE TOLERANCE TEST AND ORAL GLUCOSE CHALLENGE TEST IN GESTATIONAL DIABETES MELLITUS**

**KEY WORDS:** Gestational Diabetes Mellitus (GDM), Oral glucose challenge test (OGCT), Oral glucose Tolerance test (OGTT)

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**ABSTRACT**

Gestational diabetes mellitus (GDM) is defined by the WHO as carbohydrate intolerance of variable severity that begins or is first recognized during pregnancy, regardless of whether insulin is used for treatment or persists after pregnancy. It does not exclude the possibility of unrecognized glucose intolerance antedating the pregnancy. India has the second highest burden of diabetes in the world. In India, there are no mandated national screening or diagnostic program for GDM, resulting in a variety of screening, diagnostic and management algorithms used throughout the country. In this study, we compared the Oral Glucose Challenge Test (OGCT) & Oral Glucose Tolerance Test (OGTT) for the diagnosis of Gestational diabetes mellitus. OGCT test is done by administering 50 gms of anhydrous glucose and is considered positive if venous plasma glucose (VPG) concentration after 1 h is >140mg/dL. Women with a positive OGCT underwent 2 h, 75 grams oral glucose tolerance test (OGTT) as a confirmatory test for GDM. When any one of fasting, 1 hr and 2 hr post 75 g OGTT values were >92 mg/dL, >180 mg/dL and >153 mg/dL respectively, women were considered diabetic. We screened 1009 women for GDM by OGCT at 24-28 wks of pregnancy. Total number of women with positive OGCT was 203 (20.11%). Out of these 203 cases, 27 were found to be positive with OGTT. The entire cohort (n=1009) was also subjected to OGTT at 24-28 wks of pregnancy. Of these, same 27 patients (27/1009, 2.7%) were found to be positive for GDM and none of the patients who were OGCT negative were found to be positive with OGTT. A 50 g OGCT seems to be an effective screening test for diagnosis of GDM which can be used universally in community screening programs and can be done in non fasting state requiring only a single sample.

**INTRODUCTION**

Gestational diabetes mellitus (GDM) is defined by the WHO as carbohydrate intolerance of variable severity that begins or is first recognized during pregnancy, regardless of whether insulin is used for treatment or persists after pregnancy. It does not exclude the possibility of unrecognized glucose intolerance antedating the pregnancy [1]. Untreated, GDM can lead to a series of adverse outcomes including fetal macrosomia, sacral agenesis, neural tube defects, hydramnios, prematurity, need for C-section and preeclampsia [2]. However, GDM can often be asymptomatic in the mother. In 2015, the International Diabetic Foundation (IDF) reported that 1 in 11 people worldwide have diabetes, with 75% of them residing in low and mid income countries. India has the second highest burden of diabetes in the world, with an estimated 69.2 million cases in 2015, which is expected to increase to 123.5 million cases in 2040 [3].

In India, there is no mandated national screening or diagnostic programs for GDM, resulting in a variety of screening, diagnosis, and management algorithms used throughout the country (4-9). The questions of who, when, and how to screen and diagnose, and how to manage patients with GDM have been the subject of multiple review papers and perspective pieces. The absence of a universally accepted gold standard for the diagnosis of GDM has resulted in various recommended diagnostic glucose thresholds that have been endorsed by different groups. In 2008, the U.S. Preventive Services Task Force (USPSTF) conducted an evidence review on screening for GDM and found insufficient evidence to assess the balance of benefits and harms of screening for GDM (10). Later, the HAPO study (2008) changed the concept for diagnosis of GDM as it showed a continuous association between rising maternal plasma glucose levels and adverse neonatal and maternal outcomes (11). Subsequently, International Association of Diabetes and Pregnancy Study Groups (IADPSG) Consensus Panel revised

the criteria for diagnosis of GDM based on HAPO study taking a reference value with odds ratio of 1 for occurrence of perinatal complications like birth weight >90th percentile, cord serum C-peptide >90th percentile or percent infant body fat >90th percentile. The glucose levels at which odds ratio for these complications reached a threshold of 1.75 were estimated, and these values were FPG ≥92, 1 h ≥180 and 2 h ≥153 mg/dl, thus the diagnostic criteria for OGTT was proposed (12). However, OGTT is a cumbersome test requiring fasting status and multiple samples which is at times difficult in community health practice as a screening test.

A 50-g oral glucose challenge test (OGCT) is the more widely accepted screening method for gestational diabetes mellitus (GDM) in various other countries like North America. Typically, an OGCT is initially administered between 24 and 28 weeks' gestation to women in a nonfasting state (13). This has been proposed as it requires a shorter time commitment from the women and does not require them to be fasting besides being cost-effective (14,15). The screening tests for GDM are generally administered earlier in gestation for women and are repeated at 24 to 28 weeks' gestation if results of initial surveillance are normal. Patients who meet or exceed a screening threshold [140 mg/dL] receive an oral glucose tolerance test (OGTT), in which a 75-g oral glucose load is administered in a fasting state and plasma glucose levels are evaluated before and 1 & 2 hours after administration of the glucose load. A diagnosis of GDM is made when 1 or more glucose values fall at or above the specified thresholds (16,17).

**AIM**

To find out whether 50gms OGCT is an effective screening test for all pregnant women between 24 and 28 weeks gestation and to compare the result of OGCT with the OGTT test in pregnant women.

**MATERIAL & METHODS**

A 50 g OGCT test was administered to 1009 unselected

women at 24–28 weeks of gestation. When venous plasma glucose (VPG) concentration after 1 h was >140mg/dL, OGCT was positive. Women with a positive OGCT underwent 2 h 75 grams OGTT as a confirmatory test for diagnosis of GDM. When fasting, 1 hr and 2 hr post 75 g OGTT values were > 92 mg/dL, >180 mg/dL and >153 mg/dL respectively, women were considered diabetic. A direct OGTT test was also administered to all cases between 24-28wks without taking into consideration the result of OGCT.

**STUDY DESIGN**

This is a prospective study conducted at tertiary care hospital between April 2016 and March 2018 and was approved by hospital ethics committee.

The healthy pregnant women attending antenatal clinic who were not known to be diabetic were enrolled in this study. All women had a 50 g OGCT done between 24 and 28 weeks of gestation, regardless of fasting state. If 1 h VPG concentration was > 140mg/dL, then the screening test was considered positive. Women with a positive OGCT underwent a 75 g 2 h OGTT, which was the actual diagnostic test for GDM. When fasting, 1 hr and 2 hr post 75 g OGTT values were > 92 mg/dL, >180 mg/dL and >153 mg/dL respectively, women were considered diabetic. A direct OGTT test was also administered to all cases between 24-28wks without taking into consideration the result of OGCT.

**STATISTICAL ANALYSIS**

The data was recorded including maternal age, parity, gestational age at screening, and body mass index (BMI) were considered. Statistical analysis was performed using Chi-square- test and the difference between values was considered significant when  $P \leq 0.05$ .

**RESULTS**

We screened 1009 women for GDM by OGCT. Total number of women with positive OGCT was 203 (20.11%). Out of these 203 cases, 27 were found to be positive with OGTT (27/203, 13.30%). All the patients were also subjected directly to OGTT without taking into consideration the result of OGCT, to compare the results. However, patients who had OGCT negative, when subjected to OGTT, none was found positive.

**Table 1. Demographic characteristics of the patients**

	Antenatal cases (n = 1009)
Age (years)	28.90 ± 5.83 <sup>a</sup>
Parity	1.82 ± 2.77
Body mass index (kg/m <sup>2</sup> )	22.81 ± 6.28
Gestational age at screening (weeks)	24.46 ± 1.34

**Table 2. Results of patients (n=1009)**

	Total women tested (n)	Results n (%)
OGCT (50 g 1 h Glucose challenge test >140mg/dL)		203 (20.11%)
75 OGTT (All Women)	1009	27/1009 (2.7%)
75 OGTT, (among women having OGCT positive)	203	27/203 (13.30%)
75 OGTT, (among women having OGCT negative)	806	0/806 (0%)

**DISCUSSION**

At our unit, we screened pregnant women presenting to antenatal clinic for presence of preexisting gestational diabetes mellitus or overt diabetes mellitus. For diagnosis of GDM, women who are not found to be diabetic at initial visit were screened again between 24 and 28 weeks of gestation. In this study, we screened 1009 women for GDM by OGCT. Total

number of women with positive OGCT was 203 (20.11 %). Based on the positive OGCT, 75 g OGTT was performed to confirm the diagnosis of GDM. Out of these 203 cases, 27 were found to be positive with OGTT 27/203 (13.30%). However, patients who had OGCT negative, when subjected to OGTT, none were found positive. The total number of women diagnosed to have GDM in this study was 27/1009 (2.7%).

A 50 g OGCT proved to be a reliable test for screening for GDM. This opinion has been shared by other investigators: Shrestha et al., concluded that the 50 g OGCT is a reliable test to detect GDM. The OGCT requires a shorter time commitment from the women and does not require them to be fasting besides being cost-effective for screening purpose (13). A similar study done by Meltzer SJ had also showed similar results [14] and systemic review by van Leeuwen et al., in 2010 concluded that the 50-g OGCT is acceptable to screen for GDM [15].

The clear benefit of universal screening is shown here; we have done the OGCT test on all women presenting to antenatal clinic. And subsequently when the positive cases underwent OGTT, none of the patients who were OGCT negative were found to be positive with OGTT. It is a well-known fact that risk factors increase the likelihood of developing GDM during pregnancy, but at the same time GDM was diagnosed in women with no risk factors also.

**CONCLUSION**

As a result of this study, we may conclude that 50 g OGCT is an effective screening test for community based screening and can detect GDM when performed universally at 24–28 weeks gestation.

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