



**ORIGINAL RESEARCH PAPER**

**Gynaecology**

**STUDY OF COMPARISON OF 3 HOUR 75GM AND 3 HOUR 100GM ORAL GLUCOSE TOLERANCE TEST IN DIAGNOSING GESTATIONAL DIABETES MELLITUS**

**KEY WORDS:** Gestational Diabetes Mellitus, Oral Glucose Test

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**ABSTRACT**

To diagnose gestational diabetes mellitus, various screening tests were proposed. Previously some studies were done to compare 3 hour 100gm & 2 hour 75gm OGTT in diagnosing gestational diabetes mellitus. We studied OGTT in different way by comparing 3 hour 100gm & 3 hour 75gm OGTT. This was a prospective study done with 300 pregnant females in PBM Hospital, Bikaner. Fasting, PP1, PP2 & PP3 hour blood sugar were measured. Test was done at <20 weeks & at >28 weeks of gestation. GDM was diagnosed in 23 of 254 women (9.05%), 9 out of 116 (7.75%) females were positive with the 75-g load and 14 of 138 (10.14%) with the 100-g load. Mean fasting blood sugar was significantly high in patients with 100gm glucose test (87.38±4.47), as compared to 75 gm glucose test (85.43±5.50) (p<0.01).

**INTRODUCTION:**

Pregnancy is a physiological stress. Many changes occur in the body, more and more stress is being laid on the biochemical changes, which occur in the blood during normal pregnancy.[1] Pregnancy is a complex endocrine metabolic adaptation and diabetogenic condition involving impaired cellular insulin sensitivity, increased  $\beta$ -cell function, and moderate elevation of blood glucose levels, particularly following the ingestion of a meal.[2] These changes are increased in mid pregnancy period and cause abnormal glucose tolerance in some women (3– 5%) rendering them prone for gestational diabetes mellitus (GDM). [2-4] The incidence of GDM varies between 1-16%.[5] The prevalence of GDM in India varies from 3.8 to 21% in different parts of the country, For this reason, most pregnant women in developed countries undergo GDM testing as part of routine antenatal care. The Clinical Practice Recommendations issued by the American Diabetes Association (ADA) in 2003 (6) state that GDM is diagnosed on the basis of the oral glucose tolerance test (OGTT). The OGTT can consist of either a 3-h, 100-g glucose load (100g) [criteria of Carpenter and Coustan (7)] at fasting and 1, 2, and 3 h after glucose load, or a 2-h, 75-g glucose load (75g), with the same criteria at fasting and 1 and 2 h after glucose load. This recommendation derives from the conclusions of the ADA Fourth International Workshop Conference on Gestational Diabetes Mellitus, held in March 1997, where it was first suggested that both tests, at the same cut off values, could be used to diagnose GDM (8). Despite their supposed equivalence, the 2 tests clearly have many relevant differences. The aim of this study was to compare the performance of the 3 hour 75g and 100g tests in pregnant women.

**MATERIAL & METHODS:**

This was a prospective hospital based study done with 300 pregnant females attending ANC & outpatient department of obstetrics & gynaecology in PBM Hospital, Sardar Patel Medical College, Bikaner, Rajasthan in year 2016-17. 46 out of 300 patients did not report on second visit. Patients were randomly chosen by chit system for 75gm or 100gm oral glucose test. All recruited patients were undergone for Fasting blood sugar testing (after 8 hour fasting) and after that all were given either 75gm or 100gm oral glucose (according to selected category). PP1, PP2 & PP3 hour blood sugar were measured in both category females.

All patients were tested 2 times in their pregnancy, at <20 weeks & at >28 weeks. 116 females were recruited for 75gm & 138 females for 100gm oral glucose test.

We collected venous blood samples into iodofluoride vacutainer tubes (Becton Dickinson and Company) and measured plasma glucose with an automated enzymatic assay performed by Aerose. Statistical analysis was done by students t test. We

considered p<0.05 to be statistically significant.

Positive results are mentioned according to Carpenter Coustan criteria.

**AIMS & OBJECTIVES:**

To compare the relevance of 3 hour 75gm & 100gm oral glucose test in diagnosing gestational diabetes mellitus.

**RESULTS:**

Maternal demographic distribution of the women who underwent both the 75g and the 100g tests in early and late periods of pregnancy are reported in Table 1.

The mean glucose values at each time point for 254 women during the early period of pregnancy are shown in **Table 2**.

Mean glucose concentrations differed significantly between the 2 tests at the each time point in early period of pregnancy & significantly higher in the 100g test than the 75g test. In the late period, the mean glucose load values at each time point during the late period of pregnancy are shown in Table 3. Mean glucose concentrations differed significantly between the 2 tests at the fasting & 1-h time point (higher in 100g glucose test) but correlation at 2-h & 3-h test values were not significant.

Of 254 women tested, 14 of 138 had positive 100g test results & 9 of 116 had positive on 75g test results. This may indicate that GDM diagnosis was more likely with the 100g than the 75g test. (Table: 4)

In our study, incidence of GDM increases with increase in maternal age, parity, BMI & with positive past history of macrosomic baby, polyhydramnios, IUD, PIH or malformations. Which are given in Table 5.

**DISCUSSION:**

In the present study, the proportion of GDM was 9.05% in high risk group. Ethnically, Indian subcontinent women have high prevalence of diabetes mellitus and the relative risk of developing GDM is 11.3 times more compared to White women. Few studies conducted in India, have shown increasing trends in prevalence from 2% in 1982, 7.62% in 1991 to 16.55% in 2001, hence necessitating universal screening for GDM in India.

To date, the 2 hour 75-g glucose load in pregnancy has been used to a lesser extent than the more traditional 3 hour 100-g load, probably because the 75g test was developed to diagnose diabetes in nonpregnant persons and has had little validation in pregnant women (6). As Weiss et al. (9) have observed, generalized use of the 75g test recommended by the ADA has been impeded by the lack of data directly comparing this test with

the established 100g test. In addition, those studies that have applied both tests have done so to investigate the incidence of adverse pregnancy outcomes successfully predicted by each test<sup>55</sup>. In the current study, we also defined, at the 1-h time point for the 75-g & 100-g load, threshold glucose values above which there is an increased risk for abnormal neonatal anthropometric characteristics. Our results therefore suggest that a 1-h, 75-g oral glucose load can be used as a single test for the diagnosis of GDM.

**Brustman et al.** (10) compared the results of a 3-h, 75-g glucose load OGTT with those of a 100g test in pregnant women. They found that the 1-, 2-, and 3-h plasma glucose values for the 100g test were significantly higher than the comparable values for the 75g test in women with normal glucose tolerance and with GDM. In addition, the prevalence of results diagnostic for GDM was found to be higher with the 100g test. Weiss et al. (9) compared 75-g and 100-g glucose loads during a 2-h OGTT in 30 women with GDM and 30 healthy pregnant women and found that in healthy women, plasma glucose concentrations at both 1 and 2 h obtained after a 100-g load were significantly higher than those obtained after a 75-g load. Our results, obtained for a much larger sample population, are in agreement with those of these 2 studies. Which indicate that the 100g test is more powerful in detecting GDM.

According to our results, the recommendation that either a 100g or a 75g test can be used to diagnose GDM in the same population by use of the same cutoff values is questionable. Because we did not repeat the 75g or the 100g test for any of our study participants and because the 2 tests were not performed on the same person & on same day, but both tests were performed randomly selected pregnant females, it is possible that some of the variation revealed could be caused by case to case variability in testing or in glycemic response.

In this study, it was found that there was a significant association with increasing age and development of GDM. **Wahi P et al.** in a study done in Jammu found that, women with GDM were older, mean age in GDM group was 27.2 ± 2.3 years, while in control group it was 26.2 ± 2.3 years. (11) Similarly **Seshaiah V et al.** [4] showed age more than 25 years as a risk factor for GDM.

Mean glucose levels are significantly high with 100gm glucose test in all pregnant females as compared to 75 gm glucose test. Similar results were seen by **Soonthornpun S et al**, in 2003.

In similar study done by **Soontornpun S et al**, the prevalence of GDM 21.4% by using 100gm oral glucose test, while it was 7.1% by using 75 gm glucose test. (12)

Delivery method has to choose very carefully in diabetic mothers because of suspected complications during delivery. In our study significant no of babies to positive GDM mothers were delivered by LSCS. Similar study was done by **Maso G et al** in 2014, who obtained similar results. (13)

**CONCLUSION:**

Due to increasing trends in prevalence of GDM in India, universal screening test is required. Prevalence of GDM positivity was higher while performing 3 hour 100gm glucose test as compared to 3 hour 75 gm glucose test. 3 hour 100 gm OGTT diagnostic criteria will result in greater detection of women with impaired glucose metabolism and treating these women will reduce adverse perinatal outcomes and prevent long-term metabolic dysfunction.

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**Abbreviations:**

- OGTT: Oral Glucose Tolerance Test
- PP 1/2/3 hour blood sugar: Post prandial 1/2/3 hour blood sugar
- LSCS: lower segment caesarean section
- GDM: gestational diabetes mellitus
- IUD: intra uterine death
- PIH: pregnancy induced hypertension

**Table 1: Demographic distribution of cases**

	Total	75gm glucose test	100gm glucose test
No of patients	254	116	138
Maternal age(years)	24.5±3.99	24.55±3.95	24.5±4.04
Parity	140		
BMI	23.79±3.53	23.94±3.60	23.66±3.48
Overweight mothers	68	36	32
Family history of diabetes	81	37	44
Previous macrosomia	57	30	27

**Table 2: Mean glucose levels in early pregnancy test (<20weeks)**

Test interval	75 gm	100gm	p value
FBS	85.43±5.50	87.38±4.47	< 0.01
1 Hour	96.70±15.42	108.63±16.28	< 0.01
2 Hour	99.13±15.21	107.15±13.11	< 0.01
3 Hour	95.60±11.82	102.71±11.72	< 0.01

**Table 3: Mean glucose levels in late pregnancy test (<28 weeks)**

Test Interval	75 gm	100 gm	p value
FBS	86.83± 6.20	89.00 ± 5.29	<0.01
1 Hour	101.33± 18.33	109.37± 19.52	<0.01
2 Hour	104.43± 18.70	105.37± 17.38	0.67
3 Hour	99.60± 15.29	101.88± 16.57	0.25

**Table 4: Positive GDM cases**

Prevalence by	Total	Positive	Percentage
75 Gram OGTT	116	9	7.76
100 Gram OGTT	138	14	10.14

**Table 5: Different parameters in both OGTT**

Variable		75 Gram (n=116)	75 Gram Positive cases (n=9)	100 Gram (n=138)	100 Gram Positive Cases (n=14)
Age	≤20	19	1	23	0
	>20 to ≤25	55	2	77	4
	>25 to ≤30	34	5	30	6
	>30	8	1	8	4
BMI	<18.5	3	1	2	0
	≥18.5 - <25	77	4	104	9
	≥ 25 - <30	28	3	25	3
	≥ 30	8	1	7	2
Macroso mic Baby	Present	30	4	27	6
	Absent	86	5	111	8
	Present	18	2	20	1
	Absent	98	7	118	13
PIH	Present	21	2	23	5
	Absent	95	7	115	9
Previous IUD/SB	Present	5	1	7	1
	Absent	111	8	131	13
	Present	3	1	4	1
	Absent	113	8	134	13

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