

DIAGNOSTIC ACCURACY OF FASTING BLOOD GLUCOSE LEVEL VS GLUCOSE CHALLENGE TEST IN DIAGNOSING GESTATIONAL DIABETES

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ABSTRACT

Objective: The objective of this study is to determine the diagnostic accuracy of fasting blood sugar level and glucose challenge test for screening of gestational diabetes mellitus, taking oral glucose tolerance test (OGTT) as gold standard.

Design: This cross sectional study was carried out in Department of Obstetrics and Gynaecology, OPD of Unit-I, Lahore General Hospital, Lahore for a duration of six months from 1-1-2016 to 30-6-2016. The non-probability purposive sampling technique was used in this study. Women were asked to come on next day early in morning before breakfast with 12 hours fast. The fasting blood sample was obtained. Then women underwent 50 g non-fasting GCT (Glucose challenge) test on the same day. In both tests, reports were assessed and noted. The patients were labeled as positive or negative for GDM (Gestational Diabetes Mellitus). Then females received 75 g OGTT (Oral glucose tolerance test) one week later on next visit and gestational diabetes was confirmed by OGTT. Reports of gold standard were compared with diagnostic tests.

Results: In our study the sensitivity of FBS was 96.77% with specificity of 98.36%, PPV was 98.59%, NPV was 96.26% and diagnostic accuracy was 97.5% taking GTT as gold standard. In this study the sensitivity of GCT was 97.7% with specificity of 98.36%, PPV was 98.6%, NPV was 97.3% and diagnostic accuracy was 98% taking GTT as gold standard.

Conclusion: This study results concluded that Fasting Blood Sugar is a highly accurate test, as is the glucose challenge test for screening of Gestational diabetes mellitus and can be done as a routine screening test as it is easy, one step and cost effective.

Key words: Gestational diabetes mellitus, Fasting blood sugar, Oral Glucose tolerance test, Glucose challenge test, Glucose level

INTRODUCTION

Gestational Diabetes Mellitus (GDM) can have serious immediate as well as long term consequences, both for the mother as well as the off-spring. It seems that women of South Asian origin are not only more likely to have GDM but also suffer more from the adverse consequences of the disorder^{1,2,3,4}. The diagnosis of GDM also identifies pregnancies at increased risk of perinatal morbidity⁵.

The frequency of GDM is rising globally and may also increase further as less-stringent criteria for the diagnosis are potentially adopted. The additional burden placed on the health care system by increasing cases of GDM requires re-consideration of diagnostic approaches and currently used treatment strategies⁶. Unfortunately, screening and diagnostic tests are not

uniform worldwide, which could lead not only to under-diagnosis but also under-management of the illness⁷.

Rationale of this study is to determine the diagnostic accuracy of fasting blood sugar level and glucose challenge test for diagnosis of gestational diabetes mellitus. Literature shows controversy in results regarding diagnostic accuracy of FBS and GCT. That is why often gynecologists recommend GCT for diagnosis of GDM, however, GCT is time consuming procedure. FBS has been proposed because the values are comparatively easy to obtain and the tests require a shorter time commitment from the women having them.

To solve the controversy we want to conduct this study. This will help us to improve our knowledge and practice as well as benefit the patient. It will also help in improvement of local guidelines and in future we will

recommend more reliable and applicable test for assessment of GDM.

The objective of this study is to determine the diagnostic accuracy of fasting blood sugar level and glucose challenge test for screening of gestational diabetes mellitus, taking OGTT as gold standard.

MATERIALS AND METHODS

This was a cross sectional study , conducted in the Unit 1 of Department of Obs & Gynae in Lahore General Hospital Lahore, from 1 -6-2016 to 30-6- 2016 . 400 cases were selected by Non – probability, consecutive sampling from the OPD

Pregnant females of age 20-40 years with any parity and presenting after 20 weeks of gestation who came for antenatal examination in outpatient department.

- a) Multiple pregnancy or congenital anomaly of fetus (on USG)
- b) All High risk patients e.g; with PIH, preeclampsia, renal disease and liver disease

400 females coming to OPD fulfilling inclusion and exclusion criteria from the department of Obstetrics and Gynecology, Lahore General Hospital, Lahore were included in the study. Informed consent was taken. Females were asked to come on next day early in morning before breakfast with 12 hours fast. The Fasting blood sample was obtained. Then females underwent 50 g non-fasting GCT test on the same day. In both tests, reports were assessed and noted. Then patients were labeled as GDM positive or negative. Then females received 75 g OGTT one week later on next visit and gestational diabetes was confirmed by 75 g OGTT. Reports of gold standard were compared with diagnostic tests.

The collected data was entered and analyzed using SPSS 17. Mean and standard deviation was age and gestational age. Frequency and percentage was calculated for GDM diagnosed by OGTT. 2x2 tables was generated to calculate sensitivity, specificity, positive and negative predictive value and diagnostic accuracy of FBS and GCT.

RESULTS

In this present study total 400 cases were enrolled. The mean age of the patients was 28.80±6.33 years with minimum and maximum ages of 20 & 40 years respectively. The mean gestational age of the patients was 28.93±4.60 weeks with minimum and maximum gestational ages of 21 & 36 weeks respectively.

Table#1

The study results showed that the mean value of FBS of the patients was 5.67±1.05 mmol/L with

minimum and maximum values of 3.9 & 7.5 mmol/L respectively. In our study GDM on basis of FBS was positive in 53.25% patients and it was negative in 46.75% patients. The study results showed that the mean value of GCT of the patients was 5.76±1.16 with minimum and maximum values of 4.1 & 8.0 respectively. In this study GDM on basis of GCT was found positive in 53.75% patients and it was found negative in 46.25% patients. In this study the mean value of GTT of the patients was 8.16±3.07 with minimum and maximum values of 4.0 & 13.5 respectively. **Table#2**

The study results showed that the GDM on basis of GTT was found positive in 54.25% patients and it was found negative in 45.75% patients. In the study the sensitivity of FBS was 96.77% with specificity of 98.36%, PPV was 98.59%, NPV was 96.26% and diagnostic accuracy was 97.5% taking GTT as gold standard. **Table#3** In this study the sensitivity of GCT was 97.7% with specificity of 98.36%, PPV was 98.6%, NPV was 97 and diagnostic accuracy was 98% taking GTT as gold standard. **Table#4**

Table # 1: Descriptive statistics of age (years) and gestational age(wks)

	Age(yr)	G/Age(wks)
N	400	400
Mean	28.80	28.93
SD	6.33	4.60
Minimum	20	21
Maximum	40	36

Table 2: Descriptive statistics of FBS,GCT and GTT(mmol/L)

	FBS	GCT	GTT
N	400	400	400
Mean	5.67	5.76	8.16
SD	1.05	1.16	3.07
Minimum	3.9	4.1	4.0
Maximum	7.5	8.0	13.5

Table # 3: Comparison of FBS with GTT

		GTT		Total
		Positive	Negative	
FBS	Positive	210	3	213
	Negative	7	180	187
Total		217	183	400

Sensitivity	96.77%
Specificity	98.36%
PPV	98.59%
NPV	96.26%
Diagnostic Accuracy	97.5%

Table # 4: Comparison of GCT with GTT

		GTT		Total
		Positive	Negative	
GCT	Positive	212	3	215
	Negative	5	180	185
Total		217	183	400

Sensitivity	97.7%
Specificity	98.36%
PPV	98.6%
NPV	97.3%
Diagnostic Accuracy	98%

DISCUSSION

This study results showed that the sensitivity of GCT was 97.7% with specificity of 98.36%, PPV was 98.6%, NPV was 97.3% and diagnostic accuracy was 98% taking GTT as gold standard. Some of the studies are discussed here in favour of our study findings.

A study conducted by Huynh J, Adegbola O et al⁸ also determined the sensitivity and specificity of 50 gram of oral glucose challenge test as 100% and 91%. In another study, by Salleh M et al found the sensitivity and specificity of 50 gram OGCT as 88% and 84% with positive predictive value of 82%^{9,10,11}.

A study conducted by Tasneem Akhtar et al revealed that the diagnostic accuracy of 50 gram oral glucose challenge test in the diagnosis of GDM has been revealed as 85.54% sensitive, 93.03% specific, positive predictive value 75.53% and 96.27% negative predictive value¹². Rajab et al in 2003 reported the sensitivity and specificity of fasting blood sugar as 88.9 and 95 % respectively while the sensitivity and specificity of GCT as 100 and 93.1 % respectively^{13,14,15,16}. Donovan et al in 2013 reported sensitivity and specificity for FBS were 87 and 52 %, respectively and sensitivity & specificity for the GCT were 70 to 88 %, respectively¹⁷.

Corado F et al in 2012 found that a first-trimester fasting blood sugar of 92 or higher was predictive of a positive result on the diagnostic oral glucose tolerance test. However this study had multiple limitations and future research is needed to determine whether a fasting blood sugar could be a useful screen for gestational diabetes¹ Patricia M Rehder et al showed in their study that most common neonatal outcomes were large-for-gestational-age infants, Caeserean delivery and preterm birth. A fasting blood glucose level of 87 mg/dL was the most powerful predictor of adverse perinatal outcome^{19,20,21}.

CONCLUSION

Our study results concluded that FBS is highly accurate with sensitivity of 96.77% and specificity of 98.59%.

FBS is a reliable, cost effective and an excellent screening test for gestational diabetes.

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