Single Glucose Challenge Test Procedure for Diagnosis of Gestational Diabetes Mellitus: A Jammu Cohort Study


Abstract

Aim: To elucidate an evidence based Single Glucose Challenge test to diagnose Gestational Diabetes Mellitus (GDM).

Method: This study included 500 pregnant women in 16-32 weeks of gestation. They underwent 75g Oral Glucose Challenge test irrespective of the last meal timing and 2 hr venous blood was drawn. After 3 days they underwent 75g OGGT in the fasting state and their 2hr blood was drawn. Plasma glucose was estimated in both samples by GOD-POD method. GDM was diagnosed with 2hr Plasma glucose (PG) ≥ 7.8 mmol/l (≥140 mg/dl) based on WHO criteria. The data was analysed by computer software Microsoft excel for windows and epi-info version 6.0, CDC, Atlanta, GA.

Results: Among 500 women, 55(11%) were diagnosed as GDM by WHO criteria. It was observed that there was no statistical difference (p>0.05) between 2hr PG of GCT and 2hr PG of WHO recommended method.

Conclusion: This Single Glucose Challenge test procedure is cost-effective, evidence based and patient friendly approach to diagnose Gestational Diabetes Mellitus.

Introduction

Gestational Diabetes Mellitus (GDM) is defined as carbohydrate intolerance with recognition in or onset during pregnancy irrespective of the treatment with diet or insulin.1

Women with a history of GDM are at future risk of diabetes, predominantly type 2 diabetes, as are their children,2 therefore there are two generations at risk. Besides, any abnormal glucose intolerance during pregnancy also has adverse fetal outcome.

The American Diabetes Association (ADA) recommends two step procedures for screening and diagnosis of diabetes in selective population. Compared with selective screening, universal screening for GDM detects more cases and improves maternal and offspring prognosis. In the Indian context, screening is essential in all pregnant women as the Indian women have eleven fold increased risk of developing glucose intolerance during pregnancy compared to caucasian women.3 Hence, universal screening during pregnancy has become important in our country.

The Oral Glucose Tolerance Test (OGTT) recommended by World Health Organization (WHO) for diagnosis of GDM is simple.4 The only drawback to this procedure is that the pregnant woman has to come to the antenatal clinic in the fasting state for assessing glucose tolerance.

Hence, a study was undertaken to find out a one step procedure which serves both as a screening and a diagnostic tool at the same time and which is easy, acceptable, economical and feasible to perform in the Indian context.

Material and Methods

The present study is being conducted on patients in chronological order attending the ante-natal clinics in the Department of Gynecology and Obstetrics, Govt. SMGS Hospital in association with the Department of General Medicine, Government Medical College and Hospital, Jammu for a period of one year w.e.f. October 2010 to September 2011.

A total of 634 pregnant women were explained about the study procedure and 500 of them gave their consent to participate in the study. The study was approved by the Institutional Ethical Board.

The present study was conducted on pregnant women at 16-32 weeks of gestation. They were evaluated for presence of GDM by doing a single OGGT and then repeating on the same woman the conventional 2 hr OGCT, and finally comparing the results of these two tests to determine the efficacy to diagnose GDM. Women having prior history of diabetes mellitus were excluded from the study. Details of the women’s age, parity, past obstetric history and family history of diabetes were obtained. The blood pressure measurement was recorded and Body mass index (BMI) was calculated using prepregnancy weight.

Glucose Challenge Test (GCT)

In the antenatal clinic, a pregnant woman after undergoing preliminary clinical examination, given a 75 grams of oral glucose load, without regard to the time of last meal. A venous blood sample is collected at 2 hours for estimating plasma glucose. GDM is diagnosed if 2 hr plasma glucose is ≥ 140 mg/dl (7.77 mmol/l).

Oral Glucose Tolerance Test (OGTT)

All women subjected to 75 grams GCT advised to be on unrestricted diet, consuming at least 150 grams of carbohydrate daily and usual activity for at least three days and coming to antenatal clinic after an overnight fasting of 10-12 hr. Fasting sample is then taken, 75 grams of glucose given to them and plasma glucose is estimated at 2 hr interval. GDM is diagnosed if, the fasting plasma glucose ≥ 126 mg/dl (7 mmol/l) and/or 2 hr plasma glucose ≥ 140 mg/dl (7.77 mmol/l).

The data were analyzed with the help of computer software Microsoft excel for windows and epi-info version 6.0, CDC, Atlanta, GA. Grading retested qualitatively in terms of percentages. The agreement between the methods was assessed by the use of kappa statistic. The diagnostic accuracy was reported as sensitivity and specificity.

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Results

Of the 634 women recruited for the GCT, 500 completed the project and data derived from these patients were used for analysis. Among 500 pregnant women, 55 (11%) were diagnosed as GDM by WHO criteria. The mean age of GDM was 30 years and that of the women with normal glucose tolerance (NGT) was 25.89 years. There was a statistically significant difference in age between GDM and NGT women (p< 0.05).

Among the GDM women, 12 (22.7%) were primigravida and among the NGT women 240 (54%) were primigravida. Prevalence of GDM also increased with multigravida (p<0.05).

BMI ≥30 was observed in 30 (54.65%) of the GDM women and 130 (29.2%) of the NGT women. Thus, incidence of GDM is more when the BMI is >30 (p<0.01) which is highly significant.

Positive family history of diabetes was documented in 35 (64%) GDM women and 80 (18%) NGT women. Incidence of GDM in patients with positive family history of diabetes was found to be statistically significant (p<0.001).

Out of the 55 GDM women, 10 (18.1%) were diagnosed between 16 and 20 weeks, 20 (36.3%) between 21 and 24 weeks, 10 (18.1%) between 25 and 28 weeks, 15 (27.2%) between 29 and 32 weeks.

There was no statistically significant difference in the glycemic profile between GCT and WHO OGTT in the diagnosis of GDM (Table 1).

Discussion

Recent data show that GDM prevalence has increased by approximately 10-100% in several race/ethnicity groups during the past few years. Increase in the prevalence of GDM, has adverse effect on the mother, newborn and risk of developing diabetes to the offspring. Therefore, GDM needs attention and thus it has become imperative to carry out screening for GDM in each and every pregnant woman visiting the OPD.

The conventional 2 hour OGTT has been noticed to suffer from certain disadvantages like, for example, it calls for repeated blood testing and requires the women to report empty stomach which is not always complied and the fall-out rate is high.

The present study therefore aims at evaluating the reliability of single GCT as an effective method to diagnose GDM with the same specificity as that with 2 hour OGTT.

Preference over OGCT being GCT is a simple and easy procedure. It is economical as only one visit is needed and only one venous sample is required. GCT does not require pregnant women to come in fasting state and it causes least disturbance in a pregnant woman’s routine activities. It serves as both screening and diagnostic procedure.

The worldwide prevalence ranges from 1-14%. In our study prevalence of GDM was 11%. In our study the mean age of GDM was 30 years and that of the women with NGT was 25.89 years. While the study conducted by C Anjalakshi et al observed the mean age for GDM to be 32.5 years. There was a statistically significant difference in age between GDM and NGT women.

In our study BMI ≥30 kg/m² was observed in 30 (54.65%) of the GDM women and 130 (29.2%) of the NGT women. While in a study conducted by Chanvitya et al BMI in GDM group was observed as 24.97±4.61kg/m². Thus BMI is an important risk factor for GDM.

In our study positive family history of diabetes was documented in 35 (64%) GDM women and 80 (18%) NGT women. While positive family history of diabetes was documented in 14.8% GDM women by Jose J Jimenez-Moleon et al. Incidence of GDM in patients with positive family history of diabetes was found to be statistically significant.

Conclusion

In India where prevalence of GDM is 16.55% which is comparatively very high, thus there is need for the screening for glucose intolerance so that we can save both mother as well as child from the adverse future outcomes. The study which we have done concludes that the prevalence of GDM is 11% which is very high and in concordance with prevalence of GDM in India. The weeks of gestation in which we conducted the study is 16-32 weeks which increases the yield to detect more number of cases as the studies conducted earlier detected GDM between 24-28 weeks of gestation only.

The present study very effectively supports that 75-gms GCT performed on pregnant women is an easy, economical as well as less cumbersome procedure. Also it is a patient-friendly approach because it is performed irrespective of the last meal and patient need not to come fasting. Diagnosis of GDM may be established or excluded by this simple procedure. In this procedure patient has to come to the antenatal only once so least interference with the woman’s routine activities. However, women found to have NGT in the first visit may need to undergo GCT in the subsequent visits of all trimesters. Hence, this one step procedure serves as both screening as well as diagnostic procedure in a country with limited resources but requiring universal screening.

References