ERWEJ
EXCLUSIVE REAL WORLD EVIDENCE
erwejournal
"Your real-world evidence partner"

Original Research Open Access

Single-step DIPSI 75g Glucose Tolerance Test-For Diagnosis of Gestational Diabetes Mellitus

Ramya Vandanasetti*, Tripura Sundari, Umadevi

Krishna Institute of Medical Sciences, Secunderabad, Telangana, India

Citation: Ramya Vandanasetti, Tripura Sundari, Umadevi. Single-step DIPSI 75g Glucose Tolerance Test-For Diagnosis of Gestational Diabetes Mellitus. ERWEJ. 2022;2(2):100-106. 10.54136/ERWEJ-0202-10022

***Corresponding Author:** Ramya Vandanasetti, Krishna Institute of Medical Sciences, Secunderabad, Telangana, India, E-mail: ramyalucky123@gmail.com

Keywords: Gestational diabetes mellitus; Oral glucose challenge test (OGCT); Glucose intolerance; DIPSI criteria

Article Info:

Received: Feb 14, 2022

Accepted: Mar 15, 2022

Published: Apr 25, 2022

Abstract

Background: Gestational Diabetes Mellitus (GDM) refers to glucose intolerance diagnosed at onset or first recognition during pregnancy. Women with GDM are at risk for maternal and foetal complications, so it is important to screen all pregnant women. The present study was carried out to determine the significance and use of the 75 g Oral Glucose Challenge Test (OGCT) using the Diabetes in Pregnancy Study Group India (DIPSI) criteria for screening of GDM.

Objectives: This study was planned to analyze the incidence of GDM in pregnant women attending antenatal care clinic, using DIPSI criteria 75 g OGCT in the first trimester or at the first antenatal visit.

Methods: In this prospective observational study, 451 pregnant women attended the antenatal clinic for the first visit at gestation between 6 and 20 weeks. 75 g oral glucose is administered irrespective of whether she is in the fasting or non-fasting state, without regard to the time of the last meal and GDM was diagnosed, and treatment started. Maternal and fetal outcomes were measured.

Results: The incidence of GDM using DIPSI criteria (>140 md/dL) was 20.8% in the first trimester or first antenatal visit. Incidence of maternal and foetal complications was lower in our study when compared to other studies.

Conclusion: It is concluded that a 75 g glucose challenge test at 6-20 weeks of gestation with a cut-off value of 140 mg/dl is a reliable screening test for GDM.

Introduction

Gestational diabetes mellitus (GDM), by definition, is any degree of glucose intolerance diagnosed at onset or first recognition during pregnancy[1]. GDM affects roughly 7 % of pregnancies, with an incidence of more than 2,00,000 cases per year. The prevalence, however, varies from 3.5-21 %, depending on the population and the diagnostic criteria

that have been used[2]. The prevalence of GDM varies widely depending on the region of the country, dietary habits, and socioeconomic status[3]. Prevalence was highest among South and Central Asian women (11%)[4]. India is emerging as the capital of diabetes mellitus with ever-increasing cases of GDM, predominantly in south Indian states.

The current but widely discussed standard of care in GDM screening is the OGTT of 75 g glucose performed late at 24-28 weeks of gestation as recommended by the International Association of diabetes and pregnancy study groups (IADPSG) [5].

Early and rapid diagnosis of GDM even before 24 weeks of gestation is desirable by starting targeted early intervention including physical activity, diet modifications, or insulin/drug therapy in the first trimester itself, brings down rates of macrosomia (birth weight >4000 g) or large for gestational age (LGA) [LGA=birth weight >90th centile] infants, operative vaginal delivery, and perinatal morbidity[6, 7]. Moreover, there could be a long-term downstream effect on the offspring, thereby leading to considerable savings in healthcare costs by the possibly decreased prevalence of generational transmission of metabolic diseases.

Hence, universal screening at the first antenatal visit has become important in our country[8]. In India, DIPSI recommended single-step universal screening of all pregnant women between 24-28 weeks of gestation due to the high prevalence of GDM. One of the major advantages of DIPSI procedures includes that fasting is not required. 75 g OGCT DIPSI criteria in the first trimester or at first antenatal visit itself, which serves both as a screening and a diagnostic tool simultaneously and is easy, acceptable, economical, and feasible to perform in the Indian context[9]. Focusing on the key issue for the successful management of GDM is the early diagnosis and treatment. Hence, this study was carried out to determine the significance of OGCT between 6-20 weeks of gestation.

Methods

This prospective observational study was conducted between July 2017 and March 2019 on patients attending the antenatal clinic at Tertiary care hospital. The Institutional Ethics Committee approved the study. The study population consisted of 451 pregnant women attending the antenatal clinics between 6-20 weeks, satisfying the inclusion and exclusion criteria in the Department of Obstetrics & Gynecology. All the enrolled mothers were evaluated by detailed history taking, including age, gestational age, history of stillbirth/pregnancy loss, family history of diabetes, history of diabetes, obstetric history, detailed examination, HBA1C and other routine investigations. After undergoing preliminary clinical examination pregnant woman is given a 75 g oral glucose load, irrespective of whether she is in the fasting or non-fasting state, without regard to the time of the last meal. [10] A venous blood sample is collected at 2 hours for estimating plasma glucose by the GOD- POD method. GDM is diagnosed if 2- hour plasma glucose is ≥ 140 mg/ dl[3, 11]. Cases with positive values before 20 weeks of pregnancy were grouped as early GDM and those after

24 weeks as of late GDM Endocrinology and Dietician advice was taken for all GDM mothers. All screened GDM positive women were advised medical nutrition therapy (MNT) for two weeks, and those who did

not respond to MNT were put on metformin or insulin therapy.

Insulin therapy

The type and timing of insulin should be chosen based on the specific blood glucose levels. If the fasting glucose is greater than 90-95 mg/dl then basal insulin, long-acting insulin analog, or NPH; 4 units for example, should be started before bedtime. If fasting glucose level is too high, then basal insulin dose can be calculated according to the patient's weight, 0.2 units/kg/day. In cases where glucose level is elevated following a meal, rapid-acting insulin, or regular insulin should be advised before that specific meal, beginning with 2-4 units, or a dose of one unit per 10-15 g of carbohydrates. If both fasting and Post prandial glucose levels are elevated, a 4-injections-per-day regimen "basal and meal time insulin regimen" should be prescribed. Basal and mealtime insulin regimen is preferred over twice dose regimen because it is more likely achieves, maintains target blood glucose, and allows more flexibility. One could start by 2-4 units of rapid-acting insulin, or regular insulin before each meal, and 2-4 units of basal insulin before bedtime.

The calculated total daily dose of insulin should be divided into 2 halves (1/3 rd dose in the morning, 2/3 rd dose in the night); one half given as basal insulin at bedtime, and the other half divided between 3 meals, and given as rapid-acting, or regular insulin before meals.

All GDM mothers were given BETNOSOL prophylaxis between 32-34 weeks on an inpatient basis, daily blood sugar monitoring at home were advised, foetal growth and development of polyhydramnios were monitored by serial ultrasound scanning and were followed up to delivery to assess their perinatal outcome.

Statistical analysis

Data was coded in tabular form and analyzed by using a proper statistical method by the statistical package for the social sciences (SPSS) version 20.0. Data collected were qualitative data, e.g., maternal outcome, and quantitative data, e.g., gestational age. The Chi-square test compared the results. P-value of <0.05 was considered significant for the study.

Results

The study was performed on 451 pregnant women who attended the hospital between July 2017 and March 2019. Out of 451 pregnant women included in the study, 414 conceived spontaneously, 37 women conceived by assisted reproductive techniques, i.e., OI, IUI, IVF techniques. In the study, 430 singleton pregnancies, 21 are twin pregnancies, and most are post IVF. The mean age of our patients is 27.7 years with a standard deviation of 4.03 years. Primi gravidas were highest among the study group, i.e., 40.13%, followed by second gravidas. Incidence of GDM

was highest in patients with hypothyroidism in the study, but there was no significant association between hypothyroidism and GDM. p-value was significant in patients with connective disorders and showed association with GDM. The association may be due to the usage of steroids for connective tissue disorder, as they have a higher risk of developing GDM.

The inclusion criteria included pregnant women above six weeks and below 20 weeksHBA1C was done all pregnant women, women with normal HBA1C were only included in the study. 78% of patients had first antenatal visit below ten weeks, and 21% had first antenatal visit after 11 weeks. Only one patient had an antenatal visit at 16 weeks. No patients had their first antenatal visit after 16 weeks. 75 g OGCT was done for all pregnant women at their first visit after taking informed consent.

Results showed that among the 451 patients included, 75 g OGCT test was positive for 94 patients, i.e., 20.84%, which shows a higher incidence of GDM in our center, 21 patients had deranged values. Treatment was initiated; 69 patients were kept on MNT, 22 patients on insulin, 11 on OHA, and eight on OHA and insulin. Daily sugar monitoring at home was advised to all patients; all patients were followed up on an OPD basis.

All patients were followed up with daily home blood sugars monitoring, 425 patients had term delivery, and 23 had preterm delivery. GDM patients with no other comorbidities were followed till term in primigravida; patients with previous LSCS were delivered only after 37 completed weeks. Among the 451 patients included in the study, 292 had LSCS, 144 had a normal vaginal delivery, and 12 had a forceps delivery. Among the 94 GDM patients, majority of the patients i.e., 68 patients had LSCS, 21 had Normal Vaginal Delivery and only 4 patients had Instrumental Delivery (Forceps Delivery).

Maternal complications

Among the 451 patients, only four patients had complications. Among the 94 GDM patients, three patients had complications. One patient had atonic PPH, 1 had eclampsia, 1 had polyhydramnios, all of which were GDM cases. 1 normal patient had secondary PPH.

Foetal complications

GDM patients are prone to foetal complications like Macrosomia, neonatal hypoglycemia, hyperbilirubinemia, shoulder dystocia leading to operative delivery and neurological complications, Intrauterine growth (IUGR), New-born Intensive Care Unit (NICU) stay[12]. In the study, 15 neonates developed hyperbilirubinemia, treated with phototherapy. Prolonged NICU stay was needed for 14 babies, some being preterm babies. 4 babies developed neonatal hypoglycemia. Macrosomia was seen in 5 babies.

In the present study, one GDM patient with twin gestation had uncontrolled sugars despite treatment, had sudden IUFD of one twin at 35 weeks, the second twin delivered by emergency Lower Segment Caesarean Section (LSCS), the baby was kept in NICU, developed sepsis, and died on day 3. One GDM patient on MNT had shoulder dystocia, the baby was delivered vaginally with difficulty, and birth weight was 3.8 kgs baby developed ERBS palsy, which

was treated conservatively.

Discussion

The prevalence of diabetes mellitus is increasing in developing countries because of reduced physical activity, dietary patterns, and obesity. Prevalence rates of GDM vary worldwide and even within a country's population and depend on ethnicity. India is emerging as the capital of diabetes mellitus with ever-increasing cases of GDM. Indian women have an 11-fold increased risk of developing glucose intolerance during pregnancy compared to Caucasian women. The recent data on the prevalence of GDM in our country was 16.55% by WHO criteria of 2 hr PG ≥140 mg/dl. Therefore, universal screening during pregnancy has become important in our country[13].

The incidence of GDM using DIPSI criteria in our study was 20.8% in the first trimester or first antenatal visit. Incidence of maternal and foetal complications was lower in our study when compared to other studies. Maternal and foetal complications showed a strong association with GDM. The mode of delivery did not show any association with GDM. The incidence of LSCS in GDM patients in our study was observed 72.3% was high due to inclusion of high risk cases.

GDM at a first antenatal visit by DIPSI criteria

We screened 451 subjects for GDM using DIPSI criteria. We could find out 94 cases of GDM. Therefore, prevalence of GDM is 20.8 % in the present study. The prevalence of GDM reported in other studies is shown in Table 1 and preterm delivery in Table 2. The prevalence of preterm delivery in GDM patients in our study was observed 11.7% i.e., 11 cases out of 94 cases of GDM.

Table 1: Comparison of incidence of GDM with other studies

Studies	Prevalence of GDM (%)
Present study	20.8
Studies in South India [14]	9.9-17.8
Seshiah Veraswamy *et al* [15]	31.5
Gopal Krishna *et al* [16]	41.9
Ramya Neelakandan *et al* [17]	23.3

Table 2. Showing prevalence of preterm delivery in GDM

Studies	Prevalence of preterm delivery in GDM (%)
Present study	11.7
Mahalakshmi *et al* [18]	19
Saxena *et al* [19]	12
Somya Sinha, Niranjan *et al* [20]	22

Conclusion

Our study has shown that early diagnosis of GDM in the first trimester or at first antenatal visit and treatment of GDM improves foetal and maternal outcomes. We suggest a single non fasting OGCT with a 75 g of oral glucose load and diagnosing women with 2-hour PPG ≥140 mg/dl for universal screening. Optimal management of GDM remains a challenge for obstetricians and endocrinologists. We should try our Medicare system to convert "the diabetes capital of the world" into "the diabetes care capital of the world".

Ethical Approval

All the procedures followed in the study were in accordance with the institution's ethical standards. The institution's ethical committee had critically evaluated the study and its methodology and approved it before the study was started.

Conflict of Interest: Nil

Financial Disclosure: None

References

1. Metzger BE, Coustan DR. Summary and recommendations of the Fourth International Workshop-Conference on Gestational Diabetes Mellitus. *Diabetes Care* 1998;21:161-7.
2. Mpondo BCT, Ernest A, Dee HE. Gestational diabetes mellitus: challenges in diagnosis and management. *J Diabetes Metab Disord* 2015;14:42.
3. Rajput R, Yadav Y, Nanda S, Rajput M. Prevalence of gestational diabetes mellitus & associated risk factors at a tertiary care hospital in Haryana. *Indian J Med Res* 2013;137:728-33.
4. Thorpe LE, Berger D, Ellis JA, Bettegowda VR, Brown G, Matte T, et al. Trends and racial/ethnic disparities in

gestational diabetes among pregnant women in New York City, 1990-2001. *Am J Public Health* 2005;95(9):1536-9.

5. Rani PR, Begum J. Screening and Diagnosis of Gestational Diabetes Mellitus, Where Do We Stand. *J Clin Diagn Res* 2016;10(4):QE01-4.
6. Nielsen KK, de Courten M, Kapur A. The urgent need for universally applicable simple screening procedures and diagnostic criteria for gestational diabetes mellitus--lessons from projects funded by the World Diabetes Foundation. Glob Health Action 2012;5.
7. Garrison A. Screening, diagnosis, and management of gestational diabetes mellitus. *Am Fam Physician* 2015;91(7):460-7.
8. Sharma K, Wahi P, Gupta A, Jandial K, Bhagat R, et al. Single glucose challenge test procedure for diagnosis of gestational diabetes mellitus: A Jammu cohort study. *J Assoc Physicians India* 2013;61(8):38-9.
9. Kumar DV. A Single Glucose Challenge Test procedure for diagnosis of Gestational Diabetes Mellitus. *J Med Sci Clin Res* 2019;7(4).
10. Tripathi R, Verma D, Gupta VK. Evaluation of 75 g glucose load in non-fasting state [Diabetes in Pregnancy Study group of India (DIPSI) criteria] as a diagnostic test for gestational diabetes mellitus. *Indian J Med Res* 2017;145:209-214.
11. Fareed P, Siraj F, Lone K. Fetomaternal outcome in women with gestational diabetes mellitus. *Int J Res Med Sci* 2017;5:4151.
12. Mitanchez D, Yzydorczyk C, Simeoni U. What neonatal complications should the pediatrician be aware of in case of maternal gestational diabetes? *World J Diabetes* 2015;6(5):734-43.
13. Junnare K, Adhau S, Hegde M, Naphade P. Screening of gestational diabetes mellitus in antenatal women using JDIPSI guidelines. *Int J Res Med Sci* 2016;4:446-9.
14. Sreekanthan K, Belicita A, Vijayakumar A. Prevalence of Gestational Diabetes Mellitus in a Medical College in South India: A Pilot Study. *Indian J Clin Pract* 2014;25(4): 342-347.
15. Seshiah V, Balaji V, Balaji MS, Sanjeevi CB, Green A. Gestational diabetes mellitus in India. *J Assoc Physicians India* 2004;52:707-711.
16. Gopalakrishnan V, Singh R, Pradeep Y, Kapoor D, Rani A K, *et al.* Evaluation of the prevalence of gestational diabetes mellitus in North Indians using the International Association of Diabetes and Pregnancy Study groups (IADPSG) criteria. *J Postgrad Med* 2015;61:155-8
17. Neelakandan R, Sethu PS. Early universal screening for gestational diabetes mellitus. *J Clin Diagn Res* 2014;8:OC12-14.
18. Mahalakshmi MM, Bhavadharini B, Maheswari K, et al. Comparison of maternal and fetal outcomes among Asian Indian pregnant women with or without gestational diabetes mellitus: A situational analysis study (WINGS-3). *Indian J Endocrinol Metab* 2016;20:491-6.
19. Saxena P, Tyagi S, Prakash A, Nigam A, Trivedi SS. Pregnancy outcome of women with gestational diabetes in a tertiary level hospital of north India. *Indian J Community Med* 2011;36:120-3.
20. Sinha S, Mayadeo NM. Comparison of maternal and fetal outcomes in gestational diabetes mellitus diagnosed either by oral glucose tolerance test or diabetes in pregnancy study group India. *Int J Reprod Contraception, Obstet Gynecol* 2017;6:4526.