ORIGINAL ARTICLE

Appraisal of timing for oral glucose tolerance testing in relation to risk factors for gestational diabetes mellitus in pregnant women in a Nigerian Teaching Hospital

LC Imoh, OO Ogunkeye, PH Daru[1], NO Amadu, A Abu, SA Asorose

Departments of Chemical Pathology and [1]Obstetrics and Gynaecology, Jos University Teaching Hospital, P. M. B 2076, Jos, Nigeria

Abstract

Objective: We investigated the pattern of common risk factors present in women undergoing oral glucose tolerance test (OGTT) in our center and to determine their relationship with time of presentation for the test.

Materials and Methods: The records of women referred to the metabolic clinic for OGTT over a 1-year period were reviewed. Data available for retrieval included age, gravidity and gestational age, weight, and risk factors for gestational diabetes mellitus (GDM).

Results: Two hundred and fifty-three (253) pregnant women form the subject of this study. Thirty-five (13.8%) of the study population had GDM by WHO criteria. Approximately, 10% of the women were tested before 24 weeks and 87.6% of the women had at least one of the common risk factors as indication for testing. The most frequent indications were a history of previous macrosomic baby 77 (30.4%) and maternal obesity 61 (24.1%). Among the indications for OGTT, only a history of previous intrauterine fetal death was significantly associated with testing before 24 weeks of gestation.

Conclusion: Early screening for GDM is not common in our environment. The presence of risk factors for GDM did not prompt early screening. Public enlightenment on the risk factors for GDM and the need for early screening should be vigorously pursued particularly for women at risk for GDM.

Key words: Gestational diabetes mellitus, intra-uterine fetal death, maternal obesity, macrosomia, oral glucose tolerance test

Date of Acceptance: 17-Feb-2015

Introduction

The incidence of gestational diabetes mellitus (GDM) is on the increase reflecting the rising incidence of obesity and glucose intolerance globally.[1,2] The diagnosis of GDM is usually based on a set of criteria from oral glucose tolerance test (OGTT)–a dynamic function test involving serial monitoring of blood glucose before and after ingestion of glucose load (following a specific period of fasting).

The time of screening for GDM is crucial for subsequent management of the pregnancy particularly with regards to preventing complications. The current clinical practice seeks to maximize the sensitivity of diagnosis by delaying screening to the second half of pregnancy so as to enable the establishment of glucose intolerance following increased insulin resistance by mid-pregnancy. Current guidelines for GDM screening recommend screening of all women not known to be diabetic between 24 and 28 weeks of gestation.[3,4] However, allowance is made for early screening of women considered to be at high risk for GDM.[4,5] These include: Women who are obese, have a history of DM in the

Address for correspondence:
Dr. Lucius Chidiebere Imoh,
Departments of Chemical Pathology, Jos University Teaching Hospital, P. M. B 2076, Jos, Nigeria.
E-mail: lucius2010@yahoo.com

Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/1119-3077.163293

first degree relatives, intrauterine fetal death, macrosomic baby, and age above 35 years.[6]

In many centers in Nigeria, selective referral for OGTT to diagnose GDM is the usual practice.[7,8] Only women deemed to be at high risk for GDM are screened and the time of screening varies from early first trimester to late third trimester.[9] In this study, we sought to determine the risk factors present in women being screened for GDM and to identify the relationship (if any) with the gestational age at screening.

Materials and Methods

The data for this study were obtained by reviewing records of all pregnant women referred to the metabolic unit of the department of chemical pathology of Jos University Teaching Hospital for OGTT between July 2012 and June 2013. Women were generally referred to the unit on account of possessing risk factors for GDM. Data available for retrieval included age, gravidity and gestational age (from last menstrual period, or ultrasonography), weight, and information regarding risk factors for GDM such a history of DM in first degree relatives, maternal obesity (>90 kg), fetal macrosomia, previous intrauterine fetal death, previous GDM, glycosuria, and recurrent miscarriages, which were obtained at testing. Only subjects with complete data were included in the study. The collected data were compiled, tabulated, and analyzed using Statistical Package for Social Sciences version 15 (SPSS Inc., Chicago, IL, USA). Test for association was done using Chi-square. $P < 0.05$ was set as the level of significance.

Ethical consideration

This study was conducted after receiving appropriate approval from the Ethical Committee of our hospital. Informed consent was obtained from all subjects.

Results

Oral glucose tolerance test was carried out in a total of 274 pregnant women during the period of the study, however only, 253 were included in this study after excluding subjects with incomplete data, given a retrieval rate of 92.3%. Thirty-five (13.8%) of the study population had GDM by WHO criteria. The ages of the women ranged from 18 to 43 years with a mean (standard deviation [SD]) of 30.9 (5.0) years. The gestational ages at testing ranged from 7 to 38 weeks with a mean (SD) of 27.4 (4.8) weeks. Approximately, 10% of the women were tested before 24 weeks. Thirty-two percent (32%) of the women have had five or more pregnancies, 17.8% were >35 years old, and 87.6% had at least one documented risk factor as indication for testing [Table 1].

Table 1: General characteristics of subjects

Variable	Frequency	Percentage
Gestational age (weeks)		
<24	26	10.3
24-28	148	58.5
29-32	59	23.3
>32	20	7.9
Gravidity		
1	41	16.2
2-4	131	51.8
>5	81	32.0
Age (years)		
≤35	208	82.2
>35	45	17.8
Number of risk factors*		
1	108	42.7
2	77	30.4
3	28	11.1
4	6	2.4
Others†	34	13.4

*Risk factors - Conventional indications such as previous macrosomia, obesity, history of DM in first degree relative, previous IUFD, recurrent miscarriages. †OGTT other than the above-mentioned risk factors for GDM. GDM=Gestational diabetes mellitus; OGTT=Oral glucose tolerance test; IUFD=Intra uterine fetal death; DM=Diabetes mellitus

Table 2: Common risk factors for OGTT among subjects reviewed

Risk factors	Yes (%)	No (%)
Family history of DM	58 (22.9)	195 (77.1)
Previous macrosomia	77 (30.4)	176 (69.6)
Previous IUFD	36 (14.2)	217 (85.8)
Maternal obesity	61 (24.1)	192 (75.9)
Recurrent miscarriages	27 (10.7)	226 (89.3)

OGTT=Oral glucose tolerance test; IUFD=Intra uterine fetal death; DM=Diabetes mellitus

Table 3: Association of some risk factors for OGTT with time of testing

Risk factors	<24 weeks (%)	≥24 weeks (%)	*P*
Family history of DM			0.33
Yes	4 (6.9)	54 (93.1)	
No	22 (11.3)	173 (88.7)	
Previous macrosomia			0.35
Yes	10 (13.0)	67 (87.0)	
No	16 (9.1)	160 (90.9)	
Previous IUFD			0.01
Yes	10 (27.8)	26 (72.2)	
No	16 (7.4)	201 (92.6)	
Maternal obesity			0.27
Yes	4 (6.6)	57 (93.4)	
No	22 (10.9)	179 (89.1)	
Recurrent miscarriages			0.42
Yes	4 (14.8)	23 (85.2)	
No	22 (9.8)	203 (90.2)	
≥2 Risk factors			0.86
Yes	11 (9.9)	100 (90.1)	
No	15 (10.6)	127 (89.4)	

OGTT=Oral glucose tolerance test; IUFD=Intra uterine fetal death; DM=Diabetes mellitus

Among the risk factors for testing reviewed in this study, the most frequent risk factor was a history of previous macrosomic baby 77 (30.4%), followed by maternal obesity 61 (24.1%) and history of DM in first degree relative 58 (22.9%). Furthermore, 36 (14.2%) had previous intrauterine fetal death (IUFD) while 27 (10.7%) had a previous history of recurrent miscarriages, [Table 2].

With respect to the time for testing, a history of previous macrosomic baby, DM in the first degree relative, and recurrent miscarriages were not significantly associated with testing before 24 weeks. However, having previous IUFD was significantly associated with testing before 24 weeks of gestation [Table 3].

Discussion

The findings from this study show that OGTT was mostly requested for pregnant women who had at least one of the common risk factors for GDM such as history of previous macrosomia, obesity, DM in first degree relative, previous IUFD, and recurrent miscarriages. This reflects the selective screening for GDM in our center, which is in line with recommendations of the Fifth International Workshop Conference on GDM as well as the American Diabetes Associations (ADA) prior to 2011.[6,10] However, recent guidelines for screening proposed by the International Association of Diabetes in Pregnancy Study Groups (IADPSG) in 2008, and adopted by the (ADA) in 2011, recommended that all women not known to be diabetic should be screened between 24 and 28 weeks of pregnancy.[3,4] The decision for or against selective or universal screen remains contentious in view of the reported advantages and disadvantages of both paradigms.[11-17]

It is noteworthy that although most of the women were screened within the stipulated time of 24–28 weeks only about 10% of the women in this study were tested before 24 weeks of gestation. There are suggestions that the conventional timing of 24–28 weeks may be too late to prevent polyhydramnios, preterm deliveries, preterm premature rupture of membranes, fetal anomalies, as well as possible long-term adverse effects on the offspring.[18] Abnormalities in glucose metabolism early in pregnancy is thought to expose the fetus to *in utero* programming that may initiate future metabolic disorders including type 2 DM and obesity.[5] Furthermore, screening for OGTT later than 32 weeks in pregnancy as observed in 8.7% of the pregnant women may leave insufficient time for intervention to avoid large for gestational age babies in the index pregnancy.[19]

The reasons for late screening and the low level of early screening found in this study may be attributed to late booking of many women in our center, which is also the prevailing custom in many centers across Nigeria.[20,21] Furthermore, the lack of the uniform standard in Nigeria regarding screening and management of GDM creates knowledge gaps about the guidelines regarding screening for GDM among doctors, especially with respect to the indications and timing. This is highlighted by the fact that there was no significant relationship between most indications for testing and the likelihood of testing before 24 weeks in this study.

The current IADPSG guideline for screening for GDM recommends that all women with risk factors for GDM should be screened early in pregnancy.[4] Only a history of previous IUFD significantly prompted early screening in this study. This may not be unconnected to the fact that a history of previous IUFD would likely encourage early booking by the women, and elicit a perception of "bad obstetric history" by the doctor warranting immediate investigation. In a study conducted in India, history of fetal loss was the most frequent risk factor for screening.[22] In this study, however, history of previous macrosomia, DM in first degree relative, and maternal obesity were the more frequent indications for screening, yet they did not appear to influence early screening. The reasons for this should be further investigated.

Conclusion and Recommendations

Selective screening for GDM is the prevalent practice in our center and early screening for GDM is not common. The presence of risk factors for GDM did not appear to prompt early screening. We advocate that early screening should be encouraged particularly among women with risk factors for GDM in line with current guidelines for screening. Enlightenment on the risk factors for GDM should be pursued vigorously for the general public and Health workers alike.

References

1. Hunt KJ, Schuller KL. The increasing prevalence of diabetes in pregnancy. Obstet Gynecol Clin North Am 2007;34:173-99, vii.
2. Coetzee EJ. Pregnancy and diabetes scenario around the world: Africa. Int J Gynaecol Obstet 2009;104 Suppl 1:S39-41.
3. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2011;34 Suppl 1:S62-9.
4. International Association of Diabetes in Pregnancy Groups Consensus Panel. International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy. Diabetes Care 2010;33:676-82.
5. Nolan CJ. Controversies in gestational diabetes. Best Pract Res Clin Obstet Gynaecol 2011;25:37-49.
6. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care 2010;33 Suppl 1:S62-9.
7. Adegbola O, Ajayi GO. Screening for gestational diabetes mellitus in Nigerian pregnant women using fifty-gram oral glucose challenge test. West Afr J Med 2008;27:139-43.
8. Dim CC, Ikeme AC. The Current Trend in the Classification and Management of Diabetes Mellitus in Pregnancy. Available from: http://www.medikkajournal.

com/diabetes.html. [Last accessed on 2014 Feb 08].
9. Kuti MA, Abbiyesuku FM, Akinlade KS, Akinosun OM, Adedapo KS, Adeleye JO, *et al.* Oral glucose tolerance testing outcomes among women at high risk for gestational diabetes mellitus. J Clin Pathol 2011;64:718-21.
10. Metzger BE, Buchanan TA, Coustan DR, de Leiva A, Dunger DB, Hadden DR, *et al.* Summary and recommendations of the Fifth International Workshop-Conference on Gestational Diabetes Mellitus. Diabetes Care 2007;30 Suppl 2:S251-60.
11. Cosson E, Benbara A, Pharisien I, Nguyen MT, Revaux A, Lormeau B, *et al.* Diagnostic and prognostic performances over 9 years of a selective screening strategy for gestational diabetes mellitus in a cohort of 18,775 subjects. Diabetes Care 2013;36:598-603.
12. Cypryk K, Szymczak W, Czupryniak L, Sobczak M, Lewinski A. Gestational diabetes mellitus – An analysis of risk factors. Endokrynol Pol 2008;59:393-7.
13. Moses RG, Cheung NW. Point: Universal screening for gestational diabetes mellitus. Diabetes Care 2009;32:1349-51.
14. Cosson E, Benchimol M, Carbillon L, Pharisien I, Pariès J, Valensi P, *et al.* Universal rather than selective screening for gestational diabetes mellitus may improve fetal outcomes. Diabetes Metab 2006;32:140-6.
15. 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;5:17277.
16. Expert consensus on gestational diabetes mellitus. Summary of expert consensus. Diabetes Metab 2010;36:695-9.
17. Ugboma HA, Aburoma H, Ukaigwe P. Gestational diabetes: Risk factors, perinatal complications and screening importance in Niger Delta Region of Nigeria: A Public Health Dilemma. Int J Trop Dis Health 2012;2:42-54.
18. Bartha JL, Martinez-Del-Fresno P, Comino-Delgado R. Early diagnosis of gestational diabetes mellitus and prevention of diabetes-related complications. Eur J Obstet Gynecol Reprod Biol 2003;109:41-4.
19. Choi YJ, Kahng J, Bin JH, Lee HS, Lee JH, Kim SY, *et al.* The relationship between the timing of gestational diabetes screening and HbA1c level and neonatal outcome. Korean J Lab Med 2009;29:110-5.
20. Adewunmi A, Rabiu K, Tayo A. Gestational age at antenatal booking in Lagos, South-west Nigeria. Internet J Gynecol Obstet 2008;12:8.
21. Umoh AV, Umoiyoho AJ, Abasiattai AM, Bassey EA, James SR. Gestational age at first antenatal visit in Uyo, Nigeria. Ibom Med J 2006;1:13-7.
22. Nilofer AR, Raju VS, Dakshayini BR, Zaki SA. Screening in high-risk group of gestational diabetes mellitus with its maternal and fetal outcomes. Indian J Endocrinol Metab 2012;16 Suppl 1:S74-8.

How to cite this article: Imoh LC, Ogunkeye OO, Daru PH, Amadu NO, Abu A, Asorose SA. Appraisal of timing for oral glucose tolerance testing in relation to risk factors for gestational diabetes mellitus in pregnant women in a Nigerian Teaching Hospital. Niger J Clin Pract 2015;18:771-4.
Source of Support: Nil, **Conflict of Interest:** None declared.