

INDICATIONS FOR ORAL GLUCOSE TOLERANCE TEST (OGTT) IN A TEACHING HOSPITAL IN A SEMI RURAL SOUTH SOUTHERN PART OF NIGERIA

***Osuji K.C,¹ Ekpe E.L², Onuoha A.C³, Nwankwo C,³ Imafidon N.I,³ Fuh FN.⁴ Adunbiola P.O⁵, Ekpe Edemekong L.⁶**

¹Department of Chemical Pathology, Faculty of Basic Clinical Sciences, Ambrose Alli University Ekpoma, Edo State, Nigeria,

²Department of Chemical Pathology, Faculty of Basic Clinical Sciences, University of Calabar, Cross River State, Nigeria,

³Department of Chemical Pathology, Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria,

⁴Department of Family Medicine, Faculty of Clinical Sciences, Ambrose Alli University Ekpoma, Edo State Nigeria.

⁵Department of Internal Medicine, Faculty of Clinical Sciences, Ambrose Alli University Ekpoma, Edo State Nigeria.

⁶Department of Mass Communication, University of Calabar, Calabar, Nigeria.

. * Corresponding author:

Dr Kingsley C Osuji

Department of Chemical Pathology

Faculty of Basic Clinical Sciences

Ambrose Alli University, Ekpoma

Email: iji70@yahoo.com

ABSTRACT

Background: The oral glucose tolerance test (OGTT) is one of the World Health Organisation (WHO) and American Diabetes Association (ADA) recognised diagnostic investigations for diabetes mellitus. It is a glucose based dynamic investigation which aside from its the ability to diagnose both type 1 and type 2 diabetes mellitus has the added advantage of being able to detect impaired glucose tolerance, an independent risk factor for cardiovascular diseases. OGTT in spite of its issues with standardization is the preferred

screening and diagnostic tool for gestational diabetes mellitus (GDM) in ISTH. However, there are limited data on its utility in the south southern part of Nigeria.

Aim: This study is designed to determine the common indications for OGTT request in a typical teaching hospital located in a semirural area of south southern Nigeria.

Materials and method: This is a retrospective study carried out between January 2019 and December 2021 in the department of chemical pathology of Irrua Specialist Teaching Hospital. The records of women referred to the metabolic clinic for OGTT over the period were reviewed and relevant data including age, parity, gestational age and indications for request were retrieved and entered onto Microsoft excel spreadsheet and analysed using the 20th version of statistical package for social sciences (SPSS).

Result: A total of 312 pregnant women were seen in the unit, out of which 294 who had complete records were included in the study. Twenty-seven (9%) and 37 (12.6%) were tested before 24 and after 32 weeks of gestation respectively. The most frequent indication for OGTT request was a history of previous macrosomic baby at 85 (28%), followed by a history of DM in a first-degree relation with 50 (17%).

Conclusion: The requests for OGTT as a screening or diagnostic tool for OGTT revealed a selective approach, with history of macrosomic baby being the highest indication, followed by a history of DM in a close relative and excessive weight gain in pregnancy, other indications were impaired glucose tolerance, previous poor obstetric outcome and previous GDM. Screening for GDM was often done outside the recommended gestational age and there is a need for emphasis on early screening.

Keywords: Diabetes Mellitus, Gestational, screening, OGTT, Indications

INTRODUCTION

Diabetes mellitus is a group of metabolic disorders that is characterized by hyperglycaemia¹, it's prevalence worldwide is on the increase due majorly to an astronomical increase in the incidence of the type 2 variant of the disease, presumably as an outcome of increasing obesity and sedentary lifestyle, arising from industrialization and improved technology worldwide. Another contributory factor is the increase in life expectancy, which has expanded the population of the aged worldwide.^{1,2,3}

The global prevalence of diabetes among individuals aged 20-79 years in 2015 ranged from 7.2 – 11.4% with highly industrialized countries like China, Russia, the United States of

America (USA) and Brazil accounting for the majority of cases.¹ Interestingly, this prevalence appears to be on the increase in undeveloped and developing countries especially those in South America and Africa. The international diabetic federation estimates that Africa, which accounts for 24 million of 537 million diabetics globally will by 2045 account for 55 million of the projected 783 million diabetics worldwide. This is a 134% rise in prevalence of diabetics in Africa.^{4,5} While this total figure may not be too significant compared to the global figure, the health and financial burden associated with the disease is weighty for low-income countries such as those found in sub-Saharan Africa.⁵

The prevalence of diabetes mellitus in Nigeria is believed to have risen from less than 1% about 30 years ago to about 3.9% in the 1990s with the south western part of the country posting the highest prevalence.⁶ As at 2021, it is estimated that about 4.5 million Nigerians between the ages of 20-79 years are living with diabetes translating to a prevalence of 3.7% and that the diabetes related expenditure per person was about 499.7 United State dollars.⁵

Expectedly, type 2 diabetes is the commonest type of diabetes mellitus in Nigeria and accounts for over 90% of all the cases.⁶ It is caused by a relative deficiency of insulin and is strongly associated with obesity, in addition to a family history of DM.^{1,7} Patients commonly present very late in the course of the disease, often with symptoms and signs of complications arising from the disease, such as infections, cardiovascular and renal diseases. However, some are diagnosed at routine medical examinations or on presentation with nonspecific symptoms.^{1,8}

Gestational diabetes mellitus (GDM) which is defined as glucose intolerance developing during the second to third trimester of pregnancy in a woman, who is a known diabetic is yet another important class of diabetes mellitus.¹ A systemic review and meta-analysis of the prevalence and determinants of GDM in Nigeria by Azeez T.A et al,⁹ in 2021 found a prevalence ranging from 0.5% to 38% varying with the different populations studied, the diagnostic criteria used and the study design adopted. The study also suggested that there were inadequate studies on the prevalence and determinants of GDM in Nigeria and advised on the need for more to be done in this direction. On the other hand, Jiwani et al,¹⁰ 2012, had earlier reported that about 70-90% of all pregnant women who had diabetes mellitus, had their DM attributed to GDM.

GDM is associated with significant prenatal complications such as spontaneous abortions, foetal macrosomia, increased indications for caesarean sections and maternal morbidity and mortality. Early diagnosis and treatment have been associated with improved pregnancy outcome in these patients.¹² It has therefore, become imperative that an accurate diagnostic tool for the screening and detection of patients with glucose intolerance in pregnancy or GDM is developed.

Laboratory investigations used to screen and diagnose DM using the World Health Organization (WHO) and the American Diabetes Association (ADA) guidelines are broadly categorized into; those dependent on plasma glucose and those dependent on glycosylated haemoglobin.¹

The oral glucose tolerance test OGTT is one of the glucose-based investigations, others are: the fasting plasma glucose and (FPG), the random or casual plasma glucose (RPG) and the 2 hours post standard (75g) glucose load levels.¹ The FPG measured after an overnight fast has been the mainstay in the diagnosis of DM for over a century, while the diagnostic cut off had been changed from 140mg/dl to 126 mg/dl by the American Diabetic Association (ADA) in 1997 with a view to improving its sensitivity the fact still remains that even at that lower cut off, a significant number of patients with normal fasting glucose tolerance, could have impaired glucose tolerance, after a 2 hours standard glucose load, a validated independent risk factor for cardiovascular disease and this is common in patients with type 2 DM. Conversely, while the FPG is sensitive to derangement in insulin secretion, the 2 hours post glucose load is sensitive to insulin effect, which is the main pathology in type 2 DM.²

Thus, the need for the oral glucose tolerance test which is the oldest dynamic function test in clinical practice. It tended to provide the simultaneous information needed for the screening and diagnosis of both types 1 and 2 diabetes mellitus.²

The OGTT has the advantages of being of being able to establish whether a patient has normal glucose tolerance (NGT) or impaired glucose tolerance (IGT). It also helps to detect a patient who has impaired fasting glucose (IFG) but a normal 2hours post standard glucose load level (TPG) and these make it a better screening and diagnostic tool for DM.^{2,6} However, the OGTT is not only stressful to both the patient and the clinician in its elaborate preparations and procedure, it also has a critical issue of poor reproducibility, largely as a result of the physiological differences in insulin sensitivity and secretion by different individuals.⁶

The American Diabetes association (ADA) proposed the initial adoption of glycated haemoglobin A, (HbA_{1c}) for the diagnosis of DM especially in non pregnant adults because of the non-reproducibility of the OGTT.^{13,14} This proposal has largely been adopted by the WHO and the IDF,⁶ however, though representing a screening and diagnostic test, less demanding than the OGTT, since it does not involve fasting, drinking of a glucose solution or waiting for hours for blood to be drawn; the usefulness perceived superiority of the HbA_{1c} to the OGTT in the screening and diagnosis of DM was called to question by studies conducted by Van't Riet E et al,¹⁵ 2010 and Kramer C.K et al,¹⁶ 2010. They both posited that about 30% of patients who had DM by the ADA criteria, using FPG would be missed if HbA^{1c} was the only diagnostic tool used. Moreover, the fact that the ADA recognizes the importance of both IFG and IGT, which can only be detected with an OGTT in the detection of higher risk subjects for DM, clearly shows that HbA^{1c} may not be too useful in screening for DM in some category of patients.²

Despite the relatively widespread use, there are too few published studies on the utility of OGTT in Nigeria, the few available published works, looked majorly at data from the southwest, the north central and more recently the north western part of Nigeria.⁶

GDM is the commonest indication for an OGTT in our hospital. Our study therefore aims to look at the various indications for an OGTT in a teaching hospital located in a semi rural part

of the south southern part of Nigeria, with the hope that information generated from this study will help guide clinicians on the early diagnosis and treatment of GDM with the subsequent reduction of associated maternofetal morbidities and mortality associated with the disease.

MATERIALS AND METHODS

This is a retrospective study that was carried out between January 2019 and December 2021. Ethical approval for the study was obtained from the ethical committee of Irrua Specialist Teaching Hospital, Irrua Edo State. The data for this study was obtained by reviewing the medical records of all pregnant women referred to the metabolic unit of the department of chemical pathology, Irrua Specialist Teaching Hospital on account of suspicion of risk factors for GDM. Only hospital patients and patients referred from outside hospitals who had complete medical records, including sociodemographic records and indication for the test such as history of diabetes mellitus in a first degree relative, maternal obesity, previous history of a macrosomic baby, previous intrauterine fetal death, previous GDM and previous history of miscarriage, were included in the study. Patients with incomplete records or whose samples were not directly collected in the unit were excluded.

The department of chemical pathology in Irrua specialist teaching hospital uses the 1999 WHO recommended 2 hours duration, 75g OGTT method with a fasting and a 2 hours samples collection only.

All glucose samples were analysed in the department's routine laboratory using the Randox[®] glucose oxidase enzymatic method (Randox laboratory limited. United Kingdom) on a Selectra ProS clinical chemistry autoanalyzer.

All data were collated, entered into a Microsoft excel work sheet and analysed using the Statistical Package for Social Sciences, version 20.0 (IBM SPSS Inc. Chicago IL, USA)

Test for association will be done using chi-square and confidence level will be set at $p < 0.05$.

RESULTS

During the period under study, a total of 315 women underwent the oral glucose tolerance test in the department of chemical pathology, Irrua Specialist Teaching Hospital, However, only a total of 294 were included in this study after excluding subjects with incomplete data giving a retrieval rate of 93.3%. The ages of the women ranged from 18 to 47 years with most recurring age ranges being 35 -39years (n=103, 35%) and 30 -34years (n=72, 24.4%) respectively, while women above 44year of age accounted for only 1.7% of the screened population. Most of the women were tested between the 25th to 28th (n=130, 44.2%) and 29th and 32nd (n=100, 34%) weeks of gestation respectively, only 27 (9%) of the women were tested before 24weeks. Twenty seven point nine percent (27.9%) of the women had had five or pregnancies in the past. (Table 1) All the participants enrolled in this study were women undergoing antenatal care in the hospital or outside centres, the commonest indications for

the OGTT request were history of previous macrosomic babies and family histories of diabetes mellitus in first degree relatives, 85 (28%) and 50 (17%) respectively. Excessive weight gain in pregnancy accounted for 45 (15.8%), a previous history of GDM accounted for 25 (8.5%). Indications listed as “others” included participants who were referred based on nonspecific reasons like recurrent infections, and polycystic ovarian syndrome. (Table 2)

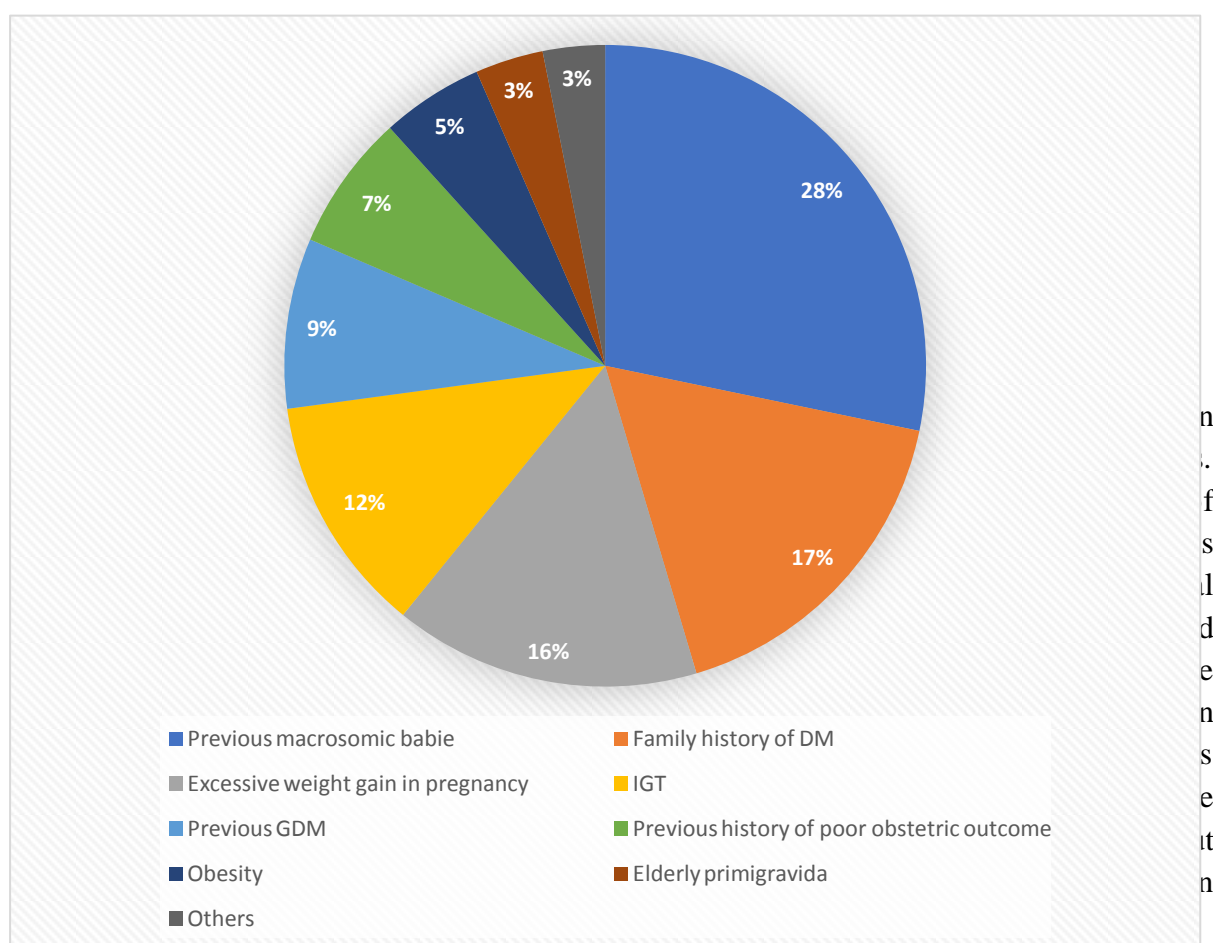
Table 1: Age, parity and gestational age of participants

Variables	Frequency	Percentage (%)
Age (years)		
<25	44	14.9
25 – 29	57	19.3
30 – 34	72	24.4
35 – 39	103	35
40 – 44	13	4.4
>44	5	1.7
Parity		
1 – 4	212	72.1
≥5	82	27.9
Gestational age (weeks)		
<24	27	9
24 – 28	130	44.2
29 – 32	100	34
>32	37	12.6

Table 2: Indications for OGTT request

Indication	Number	Percentage (%)
Family history of DM	50	17
Previous macrosomia	85	28
Maternal obesity	15	5.1
Previous poor obstetric outcome	20	6.8
Previous GDM	25	8.5
Excessive weight gain in pregnancy	45	15.8
Elderly Primigravida	10	3.4
Impaired fasting glucose	35	11.5
Others	9	3.1

Figure 1: Pie chart showing indications for OGTT requests



We found that only 44.2% of the study population were screened at the recommended period of 24 – 28 weeks of gestation, while a larger percentage of 46.6% was screened after the recommended period, probably as a result of late booking, which is a prevalent custom in many centres in Nigeria,^{25,26} other possible reasons could be the cost of the investigation and the late onset or identification of risk factors for GDM such as excessive weight gain in pregnancy.

This study found that a history of previous macrosomic babies was the largest indication for OGTT request (28%) while a family history of DM in a first degree relative accounted for

17%, followed by excessive weight gain in pregnancy which accounted for 15.3%, this largely similar to the findings in other studies^{9,27} However, Abdulsalam et al⁶ found a history of previous GDM (35.1%) family history of DM in a close relative (28.9%) and being overweight (15.5%) to be the three commonest indicators for an OGTT request in Kano, which is a large city in the North western region of Nigeria.

CONCLUSION

The selective screening approach is the prevalent modality for the use of OGTT for the screening of GDM in our centre, screening was mostly done outside the recommended period often as a result of late booking and a history of a baby with macrosomia was the most frequent indication for request.

RECOMMENDATION

It is recommended that obstetricians and indeed all clinicians should be enlightened on the need for early screening of all pregnant women for gestational diabetes mellitus and that the universal approach to screening should be adopted by all centres with a view to identifying all women with GDM in a timely fashion to enable prompt intervention.

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