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ORIGINAL ARTICLES

Gestational Diabetes Mellitus Among Women Accessing Antenatal Care at The Federal Medical Centre Ebute Metta, Southwestern Nigeria

Diabetes mellitus gestacional entre mulheres que acessam cuidados pré-natais no Centro Médico Federal Ebute Metta, sudoeste da Nigéria

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Abstract

Background: the study aimed to assess the prevalence of Gestational Diabetes Mellitus (GDM) among pregnant women at the Federal Medical Centre, Ebute Metta (FMCEB), Lagos State, Nigeria.

Materials and methods: this is a retrospective study of GDM cases at the FMCEB Lagos. Two hundred and thirty-four (234) pregnant women at 24 weeks of gestation and above were screened for GDM between the periods of November 2018 to November 2019. During Antenatal clinics, all pregnant women at 24 weeks of gestation and above who were considered to be at risk after undergoing preliminary clinical examination were given a 75g oral glucose load, using the World Health Organization standardized oral glucose tolerance test. GDM was diagnosed if 2 hours of plasma glucose was ≥140 mg/dl.

Results: the prevalence of GDM among expectant mothers was 44 (18.8%) and the mean age of women with GDM was 34.5±7.3 years while the age ranged between 20 to 50 years. The age group of 35-39 years old had the highest prevalence of GDM among the studied patients. Specifically, 31.8% (14 out of a total unknown number) of GDM patients belonged to this age group. In contrast, only 2.3% of the subjects were 50 years old, which suggests a significantly lower prevalence of GDM in this age group.

Conclusion: the high prevalence of GDM reported in this study highlights the need for increased screening and management of GDM in Nigeria. Further research is needed to develop standardized protocols for the screening and management of GDM in Nigeria, particularly in resource-limited settings.

Keywords: diagnostic criteria, gestational diabetes, oral glucose tolerance test, pregnant women, screening and management.

Resumo

Objetivo: avaliar a prevalência de diabetes mellitus gestacional (DMG) em gestantes atendidas no Centro Médico Federal de Ebute Metta (FMCEB), Estado de Lagos, Nigéria.

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Materiais e métodos: estudo retrospectivo dos casos de diabetes mellitus gestacional atendidos na FMCEB Lagos. Duzentas e trinta e quatro gestantes com 24 semanas de gestação ou mais foram rastreadas para DMG entre os períodos de novembro de 2018 a novembro de 2019. Durante as consultas de pré-natal, todas as gestantes com 24 semanas de gestação ou mais que foram consideradas de risco após serem submetidas ao exame clínico preliminar receberam uma carga oral de glicose de 75g, usando o teste de tolerância oral à glicose padronizado pela Organização Mundial de Saúde. DMG foi diagnosticada se a glicose plasmática de duas horas fosse ≥140 mg/dl.

Resultados: a prevalência de DMG entre as gestantes foi de 44 (18,8%) e a média de idade dessas mulheres foi 34,5±7,3 anos, com idades variando de 20 a 50 anos. A faixa etária de 35-39 anos apresentou a maior prevalência de DMG entre as pacientes estudadas. Especificamente, 14 (31,8%) pacientes com DMG pertenciam a essa faixa etária. Em contraste, apenas 2,3% dos indivíduos tinham 50 anos, o que sugere uma prevalência significativamente menor de DMG nessa faixa etária.

Conclusão: a alta prevalência de DMG relatada neste estudo destaca a necessidade de maior rastreamento e manejo do DMG na Nigéria. Mais pesquisas são necessárias para desenvolver protocolos padronizados para a triagem e o manejo do DMG na Nigéria, particularmente em ambientes com recursos limitados.

Palavras-chave: critérios diagnósticos, diabetes gestacional, teste oral de tolerância à glicose, gestantes, rastreamento e tratamento.

Introduction

Gestational diabetes mellitus (GDM) is distinguished from pre-diagnosed type 1 or type 2 diabetes as well as maturity-onset diabetes of the young in pregnant women by being defined as any degree of glucose intolerance with onset or first detection during pregnancy (1, 2). A reduced glucose tolerance that emerges or is initially noticed during pregnancy was the original definition of GDM. GDM is now defined as carbohydrate intolerance that has not developed or been identified for the first-time during pregnancy after the criteria were altered (3). Diagnosis of GDM poses additional risks to both the fetus and the mother, thereby placing a heavy burden on healthcare systems, particularly in settings with limited resources (4).

The worldwide occurrence of gestational diabetes is estimated to range from 1% to 28%. This broad spectrum is attributed to variations in screening techniques, diagnostic standards, ethnic backgrounds, and the age of expectant mothers (5). GDM typically affects 5% of pregnancies, though this number may change depending on the criteria utilized and the demographics of the population. The prevalence of GDM has grown due to the obesity epidemic (6). The International Diabetes Federation's estimates indicate that 14% of pregnancies worldwide, or around 18 million babies each year, are affected by GDM (7). GDM exhibits a higher prevalence in low- and middle-income countries, with the Middle East and North Africa region and the Southeast Asian region reporting the highest standardized prevalence rates at 27.6% and 20.8%, respectively. In Africa, the standardized frequency of GDM stands at 14.2% (8). However, data concerning GDM in Sub-Saharan Africa present varying outcomes. Some studies indicate a prevalence of 14% among high-risk individuals, which aligns with the figures reported by (8,9). Conversely, a systematic review and meta-analysis suggest an average GDM prevalence of 9% in Sub-Saharan Africa (10). In Nigeria specifically, estimates range widely from 0.5% to 38%, with a pooled prevalence of 11.0% (4). However, there is limited or no available information regarding the prevalence of GDM in Ebute Metta, Lagos, located in southwest Nigeria. Additionally, there's a notable absence of discussion on the significance of Oral Glucose Tolerance Tests (OGTT) as diagnostic and screening tools for prevention and improving outcomes in this context.

Pregnancies impacted by GDM increase the likelihood of cesarean and surgical vaginal birth, macrosomia, shoulder dystocia, newborn hypoglycemia, and hyperbilirubinemia (11, 12).

Women with pre-existing diabetes can be exposed to hyperglycemia in the first two trimesters of pregnancy, increasing the risk of a range of both isolated and multiple cardiovascular anomalies, including central nervous system and musculoskeletal defects (13, 14). This is in contrast with most unborn babies of women who develop glucose intolerance during pregnancy.

Risk-based screening for GDM can be performed worldwide. Obesity, body mass index above 30 kg/m^2, prior GDM, family history of GDM, ethnic family origin with a high prevalence of diabetes

mellitus (DM), clinical conditions associated with insulin resistance, such as polycystic ovarian syndrome (PCOS), acanthosis nigricans, and history of hypertension or hypercholesterolemia are characteristics of high-risk categories (15,16). Because glucose levels rise in women who cannot make enough insulin to adapt to this resistance and because insulin resistance increases throughout the second trimester, screening is typically done at 24-28 weeks of pregnancy (17, 18). The possibility of missing GDM instances rises when selective screening is used. General screening is therefore advised.

In 1999 World Health Organization defined and classified criteria for the diagnosis of GDM. These include: (i) GDM is a carbohydrate intolerance resulting in hyperglycemia of variable severity with the onset or first recognition during pregnancy, (ii) In first and early second-trimester fasting and postprandial glucose concentrations are normally lower than in normal non-pregnant women. Elevated fasting or postprandial plasma glucose levels at this time in pregnancy may well reflect the presence of diabetes mellitus which has antedated the pregnancy, (iii) Testing for GDM is usually done between 24-28 weeks of gestation and (iv) To determine if GDM, is present a standard OGTT should be performed with 75g anhydrous glucose in 250ml of water after overnight fasting of 8-14 hours. Plasma glucose is measured, by fasting, and after two hours, pregnant women who meet the criteria for DM or impaired glucose tolerance (IGT) are classified as having GDM. These women should have 75g OGTT at 6 weeks or more after delivery. Venous plasma glucose cut-off of ≥140mg/dL (7.8mmol/L) at two hours is classified as having GDM (19).

Various studies have been carried out on the prevalence of GDM in various parts of Nigeria, but few have been reported in Lagos State, Nigeria (4, 20). This present study was therefore performed to determine the prevalence of GDM and OGTT as a definitive diagnostic tool among pregnant women attending an Antenatal clinic at Federal Medical Centre, Ebute Metta (FMCEB), Lagos State, Nigeria.

Materials and methods

This study was conducted at the Chemical Pathology Unit, Department of Medical Laboratory Services, FMCEB, Lagos, Nigeria. The subjects were pregnant women aged 18–50 years at 24 weeks of gestation and above who consented to participate in the study and enrolled at the laboratory for OGTT between November 2018 and November 2019. Patients were prepared and counseled for testing. Blood and urine samples were collected from 243 women and screened for GDM. Demographic and other factors, such as age, family history of diabetes mellitus in first-degree relatives, previous history of GDM, and macrosomia, were obtained using a structured questionnaire.

A standard OGTT was performed, giving each patient 75 g of anhydrous glucose in 250 ml of water after overnight fasting for 8-14 hours. Plasma and urine glucose levels were measured at fasting, one and after two hours respectively.

Aseptically obtained 3.0 ml of patient blood into fluoride oxalate bottles. Centrifuge at 3000 g for five minutes to obtain plasma. Plasma glucose was estimated using an enzymatic (spectrophotometric) method based on the principle of the glucose oxidase-peroxidase reaction using a Randox Kit (Randox Diagnostics Inc., Richmond, BC, Canada). The results were interpreted according to the standardized oral glucose tolerance test by the World Health Organization. GDM was diagnosed if the 2-hour plasma glucose level was ≥140 mg/dl.

Urine glucose levels were also tested. by urinalysis using a urine reagent strip comb 2 (in vitro diagnostic). The interpretations of the results were carried out according to the manufacturer's guidelines. Frequency means and percentages were calculated using the IBM SPSS Statistics 18.

Ethical approval was obtained from the Institution Ethical Review Committee (Protocol number FMCEB/EC/2019/10/420). With strict adherence to Helsinki Declaration on research bioethics, a written assent was obtained from the participants, and they were given the option to exclude themselves from participating in this study.

Results

The total number of pregnant women who enrolled for the OGTT during the period was 234. The prevalence of GDM among expectant mothers was 18.8% (44/234). The mean age of women with GDM was 34.5±7.3 years and the age ranged from 20 to 50 years. The majority, comprising 31.8% (14) of GDM patients, belonged to the age group of 35 – 39 years, and only 2.3% of the subjects were 50 years old (**Table 1**).

TABLE 1 – Gestational Diabetes Mellitus distribution frequency by age group.

Age, years	N	%
20-24	4	9.2
25-29	7	15.9
30-34	8	18.1
35-39	14	31.8
40-44	7	15.9
45-49	3	6.8
≥ 50	1	2.3

Discussion

This present study conducted on pregnant women undergoing OGTT at FMCEB in Lagos, Nigeria, revealed a notable prevalence of GDM. This rate surpasses the global average reported by the International Diabetes Federation. However, this finding aligns with other studies conducted in Nigeria, indicating a significant occurrence of GDM in the region (4, 21). For instance, a separate study in Lagos reported a prevalence rate, slightly lower than the current study's findings (22, 23, 27). These results underscore the importance of enhanced screening and management of GDM in Nigeria, as highlighted by this study and previous research endeavors.

In this study, the average age of women diagnosed with GDM was relatively mature women, with the majority falling within the 35–39 age bracket. This is in line with other studies that found that the risk of GDM rose as maternal age rose (24). The importance of increasing GDM screening and management in older pregnant women is highlighted by this finding. Another recent study conducted in Lagos found that maternal age, a family history of diabetes, and a high pre-pregnancy body mass index were all significant risk factors for GDM (25). This conclusion is in line with those of the present investigation, which discovered that maternal age was a significant risk factor for GDM (25).

In Nigeria, screening, and management of GDM might be difficult due to scarce resources and a lack of standardized procedures. However, a few studies have demonstrated that individualized therapy and targeted screening can improve the results for women with GDM. A screening method like that used by a study conducted in Ekiti, Nigeria, was used in this investigation (26). We discovered that tailored screening utilizing risk factors identified more GDM cases than general screening. This present study also showed that women with GDM benefit from individualized management, including counseling on diet and exercise, close monitoring of blood glucose levels, and better outcomes.

This study provides important insights into the prevalence and risk factors for GDM in a tertiary healthcare center in Lagos, Nigeria. The high prevalence of GDM reported in this study highlights the need for increased screening and management of GDM in Nigeria. Further research is needed to develop standardized protocols for the screening and management of GDM in Nigeria, particularly in resource-limited settings.

Notes

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Conflicts of interest disclosure

The authors declare no competing interests relevant to the content of this study.

Authors' contributions

All the authors declare to have made substantial contributions to the conception, or design, or acquisition, or analysis, or interpretation of data; and drafting the work or revising it critically for important intellectual content; and to approve the version to be published.

Availability of data and responsibility for the results

All the authors declare to have had full access to the available data and they assume full responsibility for the integrity of these results.

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