Prevalence Of Gestational Diabetes Mellitus; Risk Factors Among Pregnant Women (In Abakaliki Metropolis, Ebonyi State Nigeria.)

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Abstract: Aim: To determine the prevalence of gestational diabetes and its risk factors among pregnant women in Abakaliki metropolis, Ebonyi State Nigeria. Method: A total of 250 pregnant women aged 15-44 yrs in their first and second trimester attending antenatal clinics in Ebonyi State University Teaching Hospital, Mile Four Maternity Hospital and Federal Medical Center Abakaliki were seen within the period of June 2010 to December 2011. Their age, parity, body mass index, gestational age and family history of diabetes were taken, while their gestational diabetes mellitus was assessed using 100g oral glucose tolerance test (OGTT). The plasma glucose response (PGR) was assessed and glucose tolerance status of each patient was interpreted using National Diabetes Data Group criteria. The prevalence of gestational diabetes was determined and its relationship with risk factors compared. Result: The study subjects had a mean gestational age of 26 ±6.4 weeks, mean parity of 1.5 and BMI of 26.5(+/-3.8) kg/m2. The prevalence rate of GDM diagnosed by 100g OGTT was 4.8%. This value increased significantly with increase in the age of the women. Inter-relationship between GDM and maternal age, gestational age, parity and family history was assessed using Chi-Square. The prevalence of GDM in pregnant women within the age of 15-24years was 3.3%, 25-34years had 4.2% and 34-44years had 17.6%. The prevalence of GDM increased significantly with increase in age of the subjects (P = 0.035). Prevalence of GDM according to the gestational age of 1st trimester, 2nd trimester and 3rd trimester were 7.7%, 5.6% and 3.9% respectively. The relationship however was not statistically significant (P = 0.736. The prevalence of GDM according to the parity of the women at 0, 1-4 and ≥5 were 5.1%, 4.1% and 8.0% respectively. The relationship also showed no significant difference (P = 0.689). The women with family history of diabetes had GDM prevalence of 4.5% while those without family history of diabetes had 4.8%. No significant difference was observed (P-value = 0.953) Conclusion: The prevalence of gestational diabetes mellitus in this region of the country was found to be 4.8%. The high value could be linked to malnutrition. This value was found to increase significantly with increase in the age of the women. No significant difference was observed when GDM was related to parity, family history of diabetes and gestational age. Since most women with GDM have no demonstrable risk factor, for this reason we advocate to screen all pregnant women. [Ewenighi O et al NJIRM 2013; 4(1) : 56-61]

Key Words: Abakaliki, Gestational Diabetes Mellitus, Oral Glucose Tolerance Test, Pregnancy, Prevalence.

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Introduction: Gestational diabetes mellitus is defined as glucose intolerance of variable degree with onset or first recognition during pregnancy which as a concept existed since 1946 [1.] This definition acknowledges the possibility that patient may have previously undiagnosed DM or may have developed D.M coincidentally with pregnancy. Gestational diabetes usually resolves after delivery and whether symptoms subside after pregnancy is also irrelevant to the diagnosis [2.] The precise mechanisms underlying gestational diabetes remain unknown. The hallmark of GDM is increased insulin resistance. Pregnancy hormones and other factors are thought to interfere with the action of insulin as it binds to the insulin receptor. Insulin resistance is a normal phenomenon emerging in the second trimester of pregnancy, which progresses thereafter to levels seen in non-pregnant patients with type 2 diabetes. It is unclear why some patients are unable to balance insulin needs and develop GDM, however a number of explanations have been given, similar to those in type 2 diabetes, autoimmunity, single gene mutations, obesity, and other mechanisms [3.]

About 40-60% of women with GDM exhibit no symptoms for this reason many advocate to screen all women. but some women may demonstrate increased thirst, increased urination, fatigue, nausea and vomiting, bladder infection, yeast infections and blurred vision [2.]

GDM poses a risk to mother and child. This risk is largely related to high blood glucose levels and its consequences. The two main risks GDM imposes on the baby are growth abnormalities and chemical imbalances after birth, which may require admission to a neonatal intensive care unit. Infants born to mothers with GDM are at risk of being large for gestational age 4.. GDM also interferes with maturation, causing dysmature babies prone to respiratory distress syndrome due to incomplete lung maturation and impaired surfactant synthesis [2]. GDM gradually develops and is least pronounced during the first trimester. Studies have shown that the offspring of women with GDM are at a higher risk for congenital malformations. Women with gestational diabetes are at increased risk of non-insulin dependent diabetes and their babies are at increased risk of adverse perinatal outcomes. These risks can be reduced by better detection and control of gestational diabetes 5-6. A large case-control study found that gestational diabetes was linked with a limited group of birth defects, and that this association was generally limited to women with a higher body mass index (≥ 25 kg/m²) 5. All these complications are preventable as they are related to the degree of maternal glycaemic control.

Risk factors for developing gestational diabetes include; previous diagnosis of gestational diabetes or prediabetes, impaired glucose tolerance, or impaired fasting glycaemia, family history revealing a first degree relative with type 2 diabetes, maternal age, overweight and previous pregnancy which resulted in a child with a high birth weight [7.] In addition to this, statistics show a double risk of GDM in smokers [8.] Polycystic ovarian syndrome is also a risk factor, although relevant evidence remains controversial [9.] Maternal age and body mass index (BMI) are important risk factors for gestational diabetes mellitus (GDM) particularly amongst South Asian and Black African women and the risks become significantly and progressively increased from 25 years onwards [2,10] Parity, Low birth weight or having a mother who was diabetic during pregnancy increases the risk of gestational diabetes [10.]

So far, there is no documented research on the prevalence of gestational diabetes in this community and that is why the study was thought necessary. The present study aimed at:
Evaluating the prevalence of gestational diabetes among the pregnant women in abakaliki metropolis.

Comparing the prevalence of gestational diabetes in a rural community Ebonyi State, Nigeria with other communities. Establishing if relationship exists between gestational diabetes and gestational age, parity, family history and age of the pregnant women.

Materials and Methods: This study comprised of 250 pregnant women aged 15-44 yrs in their first trimester and above attending antenatal clinics in Ebonyi State University Teaching Hospital, Mile Four Maternity Hospital and Federal Medical Center Abakaliki within the period of June 2010 to December 2011. After obtaining permission from hospital authority, a questionnaire on medical history was given to each of the patients to ascertain their age, parity, previous exposure to GDM and family history of diabetes while body mass index and gestational age were determined. The diagnosis of GDM was based on National Diabetes Data Group (NDDG) criteria for 100g OGTT and plasma glucose response (PGR) was measured at 0, 1, 2 and 3 hours interval using glucose oxidase method by (Randox, United Kingdom). No pregnant woman was excluded from the research rather all that attended the clinic were screened for GDM.

Oral glucose tolerance test (OGTT): The OGTT was done in the morning after an overnight fast. 2ml of blood was collected into a sodium fluoride-oxalate bottle as 0 hour time before a solution containing

100g of glucose was given to the patients after which blood samples were collected at 1, 2 and 3 hours respectively. Plasma glucose levels were interpreted using NDDG criteria.

- Fasting blood glucose level ≥105 mg/dl (5.8 mmol/L)
- 1 hour blood glucose level ≥190 mg/dl (10.6 mmol/L)
- 2 hour blood glucose level ≥165 mg/dl (9.2 mmol/L)
- 3 hour blood glucose level ≥145 mg/dl (8.1 mmol/L)

Patients whose plasma glucose level met or exceeded any two threshold values for glucose after the 100-g OGTT is considered positive for GDM.

Statistical Analysis: The data was put in using Epi Info and analyzed with SPSS Version 16. The analyses include the following descriptive statistics: Mean, Standard deviation, and Percentage. To compare the proportion of GDM across the age groups, weight, gestational age and family history of diabetes mellitus Chi-square test was employed.

Results: During the period of this study, a total number of 250 antenatal patients were tested. The study subjects had a mean gestational age of 6.40 ±1.6 months, mean parity of 1.5 and BMI of 26.5(+/-3.8) kg/m^2. The prevalence rate of GDM diagnosed by 100g OGTT was 4.8% (see figure 1).

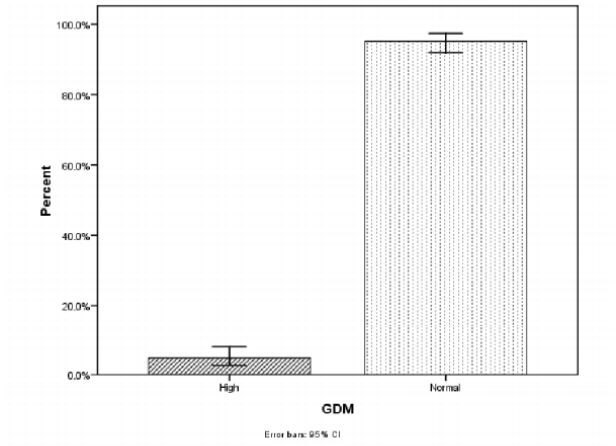

Figure 1: A bar chart showing the prevalence of GDM in Abakaliki metropolis

This value increased significantly with increase in the age of the women (P = 0.035). The prevalence of GDM in pregnant women within the age of 15-24years was found to be 3.3%, 25-34years had 4.2% and 34-44years had 17.6%, see figure 2.

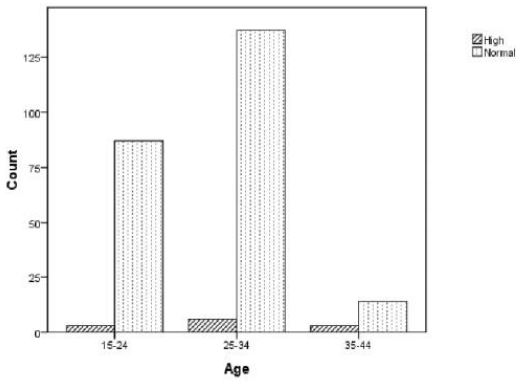

Figure 2: A bar chart showing prevalence of GDM according to age group in Abakaliki Metropolis.

Relating GDM with gestational age of the subjects showed that 13 out of the 250 pregnant women fell under 1st trimester and 1(7.7%) out of the 13 had GDM, 108 out of the 250 pregnant women fell under 2nd trimester and 6(5.6%) out of the 108 had GDM, 129 out of the 250 pregnant women fell under 3rd trimester and 5(3.9%) out of the 129 had GDM. There was a non significant decrease in GDM as the gestational age increases (P = 0.736), see figure 3.

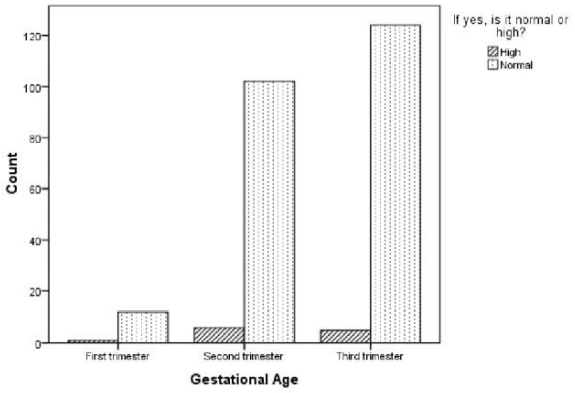

Figure 3: A bar chart showing prevalence of GDM according to gestational age.

Among the 250 subjects, 78 of them had parity of 0 and 4(5.1%) out of the 78 had GDM, 147 out of the 250 pregnant women had parity of 1-4 and 6(4.1%) out of the 147 had GDM , 25 out of the 250 pregnant women had a parity of ≥5 and 2(8.0%) out of the 25 women had GDM, the comparison showed no significant difference when compared (P = .689) see figure 4.

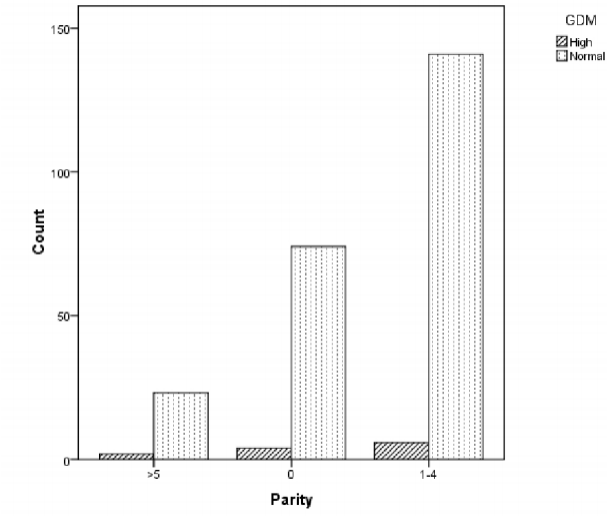

Figure 4: A bar chart showing prevalence of GDM according to parity

22 out of the 250 women had family history of diabetes and 1(4.5%) out of the 22 tested positive for GDM while 11(4.8%) out of the 228 women who had no family history of diabetes tested positive for GDM, no significant difference was observed (P = .953), see figure 5.

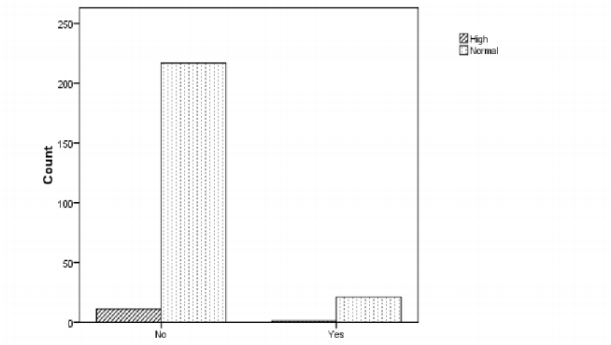

Figure 5: A bar chart showing prevalence of GDM according to family history of diabetes

Discussion: In the present study, the prevalence of gestational diabetes was found to be 4.8%. Depending on the population studied gestational diabetes affect 3-10% of pregnancies globally [2.] Earlier studies on gestational diabetes in Nigeria have shown that gestational diabetes has been on the increase. The work of Erasmus, *et. al.* [11] reported a prevalence of 0 to 0.1%, Swai and colleagues [12] reported GDM to be non-existent, Adendokum, *et. al.* [13] showed only 1% whereas recent population surveys show prevalence rates of 0.15 -3.0% by Wokoma *et al* [14,] and 1.7% by Ozumba *et. al.* [15.] The prevalence rate of gestational diabetes mellitus is also dependent on the screening method applied. In this study, we used National Diabetes Data Group (NDDG) criteria for 100g OGTT method and obtained a prevalence of 4.8% while the prevalence analysis by Olarinoye *et. al*., [16] in Kwara State, Nigeria using 75g OGTT was 11.6% and that of 100g OGTT was 4.5 %. The work of Adegbola and Ajayi [17] using fifty-gram oral glucose challenge test showed a prevalence of 5.4% in Lagos state, Nigeria. Thus our finding only agreed with the work of Olarinoye *et. al*., [16] using 100g OGTT.

The present study shows a high prevalence rate as GDM seems to be increasing with time. Another possible reason found to be the cause for the high prevalence of GDM in our study is the exposure of those pregnant women to malnutrition during their intrauterine life.

Strong association exists between GDM development and advancing maternal age. Our finding also shows that gestational diabetes significantly increases with age of an individual, this further strengthens the evidence that a woman's risk factor increases as she gets older [18,2,7,19,20] This finding also explains the reason American Diabetes Association and the Society of Obstetricians and Gynaecologists of Canada recommend routine screening unless the patient is at low risk (this means the woman must be younger than 25 years and have a body mass index less than 27, with no personal, ethnic or family risk factors) [2]. The progressive increase in the prevalence of GDM from 3.3% - 4.2% - 17.6% in mothers of age 15-24, 25-34 and 35-44 years respectively as observed in our present study agrees with the work of Makgoba *et*. *al*., [10] which proved that the rate of GDM rose rapidly with age especially in blacks. For example, in mothers aged 40 years or more, the rate of GDM had risen to 1.9% in white European mothers (from 0.5% at age 20-24), but to 11.4% in South Asians (from 1.1) and 21.7% in black Africans (from 0.7%).

In this present study, we also compared the inter-relationship that exists among gestational diabetes with gestational age, parity and family history of diabetes. No significant difference was observed

when gestational diabetes was compared with parity, family history of diabetes and gestational age. As regards family history of diabetes, our finding does not agree with the work of Fatema *et. al*., in Pakistan [21], that a positive family history in first-degree relatives was present in nearly half the subjects (pregnant women). This finding also disagrees with the work of Okeh & Okeh,[22] that the only recognised risk factor between non GDM women and women developing GDM late in pregnancy is family history of type 2 DM. The work of Bener *et. al.* 19 extensively analysed the risk factors associated with gestational diabetes and found out that advanced maternal age, low monthly income, family history of diabetes, and obesity were the main significant risk factors for GDM but our study in Nigeria only shows a significant difference in maternal age. It is important to note that the prevalence of GDM rather decreases as the gestational age increases thus 1st trimester had the highest prevalence while the 3rd trimester had the least. This finding agrees with the work of Modupe *et. al*.[20] that the prevalence rate of GDM among women in the first trimester was highest although most of their diagnoses were made in the third trimester.

Nevertheless, our finding on comparison of gestational diabetes with the above stated risk factors further strengthens the findings of Dacus *et. al*., [23], that approximately half of women with gestational diabetes do not have historic risk factors and approximately half of non-diabetic women do have historic risk factors.

Conclusion: The present study shows a high (4.8%) prevalence of gestational diabetes among pregnant women in this community. This could be as a result of high level of malnutrition observed in the course of our study. This value also increased significantly (P = 0.035) with the maternal age thus confirming a strong relationship between gestational diabetes and maternal age. There was no significant difference observed when gestational diabetes was compared with parity, gestational age and family history of diabetes. We therefore advocate for compulsory screening of all pregnant women irrespective of risk factors.

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