Pyramid Journal of Medicine
Pyramid Journal of Medicine 2026; 9:561
doi:10.4081/pjm.2026.561

Prevalence and maternal-fetal outcome among patients with gestational diabetes at Aminu Kano Teaching Hospital

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Abstract

Gestational Diabetes Mellitus (GDM) is any degree of glucose intolerance with onset or first recognition during pregnancy. Women with GDM are at increased risk of adverse obstetric and perinatal outcome. The aim of this study is to review and determine the prevalence of GDM in Aminu Kano Teaching Hospital, Nigeria. It is a retrospective study on women with GDM attending the antenatal clinic of Aminu Kano Teaching Hospital from January 2019 to December 2019. Patients with GDM were identified by getting their Oral Glucose Tolerance Test (OGTT) results from the register of chemical pathology laboratory, then their case folders were retrieved from the records department and their socio-demographic characteristics were filled into a proforma and analysed using the Statistical Package for Social Sciences (SPSS) version 23. Results were presented using descriptive statistics (tables, charts and chi-square test). A total of 2416 clients attended antenatal clinic during the study period. 217 patients had an indication for OGTT which was done in chemical pathology lab of Aminu Kano Teaching Hospital. The OGTT result of 48 patients fell within the diagnostic value of GDM giving a prevalence of 2%. The peak age range was 31-35 years with a mean age of 31.9±4.61. Most - 23 (69.7%) - were Hausa by tribe with either secondary 17 (51.5%) or tertiary education 16 (48.5%), but mostly full-time house wives 16 (48.5%). In this study, the most common associated factor was family history of diabetes (27%), followed by those with a previous history of GDM (15%) then previous delivery of a macrosomic baby (12%) and associated medical condition (12%), then those with a history of sudden Intrauterine Fetal Demise (IUFD) (3%). There was a statistically significant difference between the obstetric outcome and the abnormality in blood sugar level. The prevalence of GDM in this study is low but falls within the global range. The most common associated factor was family history of diabetes and there was a statistically significant association between the obstetric outcome and the abnormality in blood sugar level.

Key words: associated factors, gestational diabetes, oral glucose tolerance test, prevalence.

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Introduction

Gestational Diabetes Mellitus (GDM) is a form of diabetes in women of child-bearing age and it is a common gestational endocrine disease.[1] GDM is any degree of glucose intolerance with onset or first recognition during pregnancy. GDM develops during the second and third trimester of pregnancy.[2] The American Diabetes Association defines GDM as "diabetes diagnosed during pregnancy that is not clearly overt diabetes".[3] Pregnancies complicated by GDM have increased risk of obstetrics, neonatal adverse outcomes. Neonatal complications include fetal macrosomia, neonatal hypoglycaemia, hypocalcaemia, polycythaemias, hyperbilirubinemia, neonatal respiratory distress syndrome and increased perinatal mortality.[4,5] Maternal complications include hypertension, preeclampsia, shoulder dystocia, increased risk of caesarean delivery and increased risk of developing type 2 diabetes.[4-7]

The true prevalence of GDM is unknown, however, in the United States it is estimated to affect 2-10% of pregnancies.[8,9] In a study conducted in Africa, the prevalence figures ranged from 0% (Tanzania) to 13.9% (Nigeria).[10] In another African study, the prevalence of GDM was 13.61% and 14.28% in the sub-Saharan African region, with the highest prevalence seen in Central Africa 20.4%, and lowest in Northern Africa sub-regions.[11]

Risk factors for GDM include higher parity, advanced maternal age, family history of diabetes mellitus, non-white race, overweight and obesity, cigarette smoking, increasing pre-pregnancy body mass index, weight gain of more than 8 kg during pregnancy, GDM history in previous pregnancies, history of diabetes in first-degree relatives, history of fetal macrosomia, history of stillbirth, history of abortion, chronic hypertension.[2,12,13]

Pregnancy has an effect on glucose metabolism and insulin sensitivity. With advancing gestational age, there is an increased demand on the maternal pancreas to increase insulin production. GDM results when these needs are not met.

The most recognized diagnostic test for GDM is the Oral Glucose Tolerance Test (OGTT) usually performed between 24-28 weeks of gestation.[14]

The NICE guideline 2019 criteria for diagnosis of GDM is Fasting Blood Glucose (FBG) of ≥5.6 mmol/L or 2-Hr BG of ≥7.8 mmol/L.[14] The first line of treatment of GDM is with diet and modest exercise alone; however, if the glycaemic targets are not met,

metformin alone or metformin and insulin is required.[15]

A systemic review showed that women diagnosed with GDM demonstrated higher odds of adverse obstetric and neonatal outcomes. Specifically, they were more likely to undergo caesarean section, experience preterm delivery, have infants with a low one-minute Apgar score, macrosomia, delivering large-for-gestational-age infants, as well as neonates with respiratory distress syndrome or neonatal jaundice. Furthermore, their infants were more likely to require Neonatal Intensive Care Unit (NICU) admission compared with infants of women without diabetes.[16]

Objectives

The aim of this study is to review and determine the prevalence of gestational diabetes mellitus (GDM) in Aminu Kano Teaching Hospital. The objectives of the study include: i) to determine the prevalence of GDM amongst women attending antenatal clinic in Aminu Kano Teaching Hospital; ii) to determine associated factors among women with GDM attending antenatal clinic in Aminu Kano Teaching Hospital; iii) to determine the outcome of the pregnancy amongst pregnant women with GDM attending antenatal clinic in Aminu Kano Teaching Hospital; iv) to compare the rate of complication with the level of glucose at diagnosis.

Materials and Methods

It is a retrospective study on women with GDM attending the antenatal clinic of Aminu Kano Teaching Hospital from January 2019 to December 2019. Patients with GDM were identified by getting their OGTT results from the register of chemical pathology laboratory, then their case folders were retrieved from the records department and information like the age, parity, tribe, family history of DM were filled into a proforma and analysed using the Statistical Package for Social Sciences (SPSS) version 23. Results were presented using descriptive statistics (tables, charts and figures).

Results

A total of 2416 clients attended antenatal clinic during the study period. Two-hundred and seventeen patients had an indication for OGTT which was done in chemical pathology laboratory of Aminu Kano Teaching Hospital during the study period. The OGTT result of 48 patients fell within the diagnostic value of GDM giving a prevalence of 0.02 (2%). Among the 48 cases, only 33 folders could be retrieved from the health record's department, giving a retrieval rate of 68.7%, and these were the ones analysed.

The peak age range was 31-35 years (36.4%) with a mean age of 31.9±4.61. Most were Hausa tribe (69.7%) with either secondary (51.5%) or tertiary education (48.5%), but mostly full-time housewives (48.5%) (Table 1). The condition was seen more amongst grand multipara (55%) with least in primigravidae (15%). Majority of the patients were diagnosed with the condition in their last trimester (75.8%) of pregnancy with 21% diagnosed in the 2nd trimester (Figures 1 and 2). The booking weight of most of the patients (76%) was less than 90 kg, only 24% had a booking weight above 90 kg (Figure 3). Fifty-four point five percent of the patients had an abnormal value in both FBS and Two-Hour Post-Prandial Glucose (2HPP), while 45.5% had an isolated abnormal 2HPP value with a normal FBS value (Table 2). The most common associated factor was family history of diabetes (27%), followed by those with a previous history of GDM (15%) then previous delivery of macrosomic baby (12%) and associated medical condition (12%), then those with a history of sudden IUFD (3%). No associated factor was found in (30.3%) (Table 3). The obstetrics outcome in majority turned out to be normal in about half of the patients (45.5%) with the highest abnormality being pregnancy induced hypertension (24.4%), then fetal macrosomia (15%) and IUGR (15%). Most of the neonates (54.5%) were admitted to Special Care Baby Unit (SCBU) after delivery, 39% did not

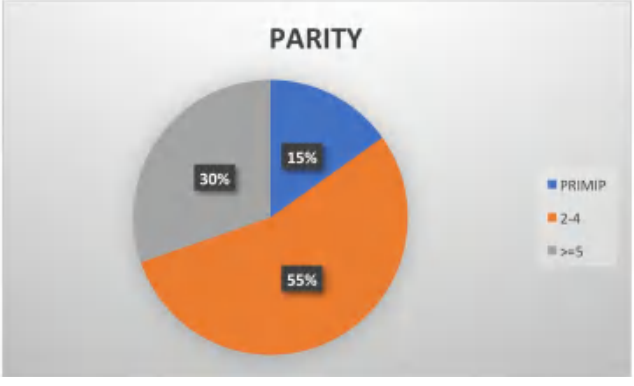

Figure 1. Parity of the patients. PRIMIP, Primipara.

Table 1. Sociodemographic variables of respondents.

Parameters	Frequency	Percentage (%)
Age		
15-20	0	0
21-24	3	9.1
25-30	9	27.3
31-35	12	36.4
>35	9	27.3
Education		
No formal education	0	0
Primary	0	0
Secondary	17	51.5
Tertiary	16	48.5
Tribe		
Hausa	23	69.7
Fulani	1	3.0
Igbo	5	15.2
Yoruba	3	9.1
Others	1	3.0
Occupation		
Housewife	16	48.5
Civil servant	11	33.3

Table 2. Blood sugar level at diagnosis.

Sugar level	Frequency	Percentage (%)
Both abnormal (FBS, 2HPP)	18	54.5
Isolated 2HPP abnormality	15	45.5
Total	33	100.0

FBS, Fasting Blood Sugar; 2HPP, Two-Hour Post-Prandial Glucose

require admission and 6% were stillbirth (Table 4). More than half (64%) of the patients had a normal spontaneous vaginal delivery (Figure 4). There was a statistically significant association between the obstetric outcome and the abnormality in blood sugar level. Those with altered level of FBS and 2HPP had poorer obstetric outcome (Pregnancy-Induced Hypertension, PIH; Intrauterine Growth Restriction, IUGR), compared to those with isolated 2HPP abnormality (Table 5). There was no statistically significant association between the neonatal outcome and the abnormality in blood sugar level (Table 6).

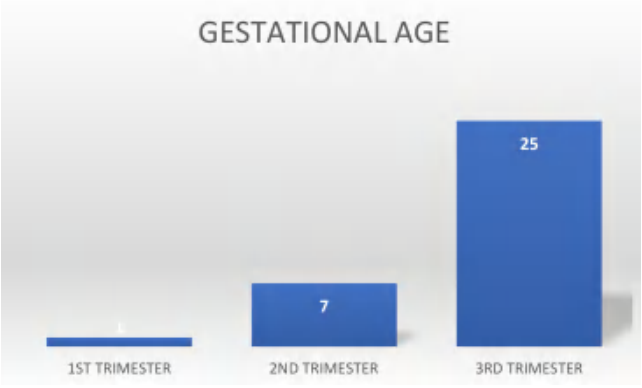

Figure 2. Gestational age at diagnosis of Gestational Diabetes Mellitus (GDM).

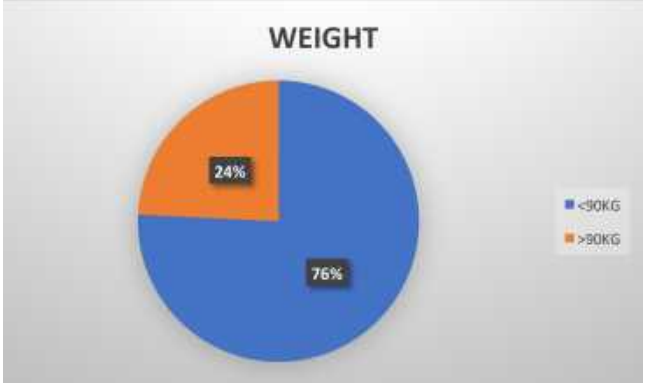

Figure 3. Booking weight of the patients).

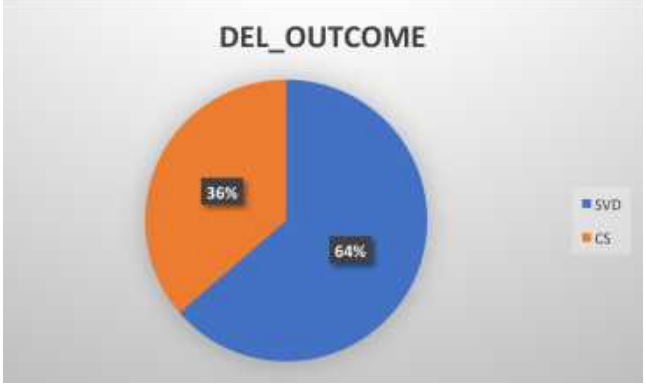

Figure 4. Route of delivery of the respondents. SVD, Spontaneous Vaginal Delivery; CS, Caesarean Section.

Discussion

GDM is a common health problem and the prevalence is rising globally. Its prevalence varies globally ranging from 1% to 14% of

Table 3. Associated factors.

Associated factors	Frequency	Percentage (%)
Previous GDM	5	27
FMHx DM	9	15
FMHx GDM	0	0
Medical condition	4	12
Previous fetal macrosomia	4	12
Previous sudden IUFD	1	3

GDM, Gestational Diabetes Mellitus; FMHx, Family History; DM, Diabetes Mellitus, IUFD, Intrauterine Fetal Demise.

Table 4. Maternal and neonatal outcome.

Maternal	Frequency	Percentage (%)
Macrosomia	5	15.2
PIH	8	24.2
IUGR	5	15.2
Normal	15	45.5
Neonatal		
Normal	13	39.4
SCBU admission	18	54.5
Stillbirth	2	6

PIH, Pregnancy-Induced Hypertension; IUGR, Intrauterine Growth Restriction; SCBU, Special Care Baby Unit.

Table 5. Obstetric outcome *vs* blood sugar level.

Obstetric outcome	Both abnormal	Isolated 2HPP	Total
Macrosomia	2	3	5
PIH	7	1	8
IUGR	4	1	5
Normal	5	10	15
Total	18	15	33

X^2=7.960; df=3; significant p=0.047. PIH, Pregnancy-Induced Hypertension; IUGR, Intrauterine Growth Restriction.

Table 6. Neonatal outcome *vs* blood sugar level.

Fetal outcome	Both abnormal	Isolated 2HPP	Total
Normal	5	8	13
SCBU admission	12	6	18
Still birth	1	1	2
Total	18	15	33

X^2=2.440; df=2; non-significant p=0.295. 2HPP, Two-Hour Post-Prandial Glucose; SCBU, Special Care Baby Unit.

all pregnancies.[15] In Africa, the pooled prevalence of GDM was 13.61%.[10] In this study however, the prevalence was 2%, this is lower than the findings in Jos,[17] Turkey,[12] India[17] and that in south-east Nigeria.[18] The prevalence in this study is low because it considered only that had the OGTT test done in the hospital, those that did their test outside the hospital could not be included. Also, different guidelines for diagnosis of GDM were used for different studies. NICE guideline 2019 was used for this study.[15]

In many studies, the prevalence of GDM has been shown to increase with increasing maternal age. [10,12] Likewise in this study, more than half of the patients were above 30 years of age with a mean age of 31.9 years. This is similar to the findings in Jos Nigeria,[17] Trabzon,[12] and Iran.[18] The condition was found to be more prevalent with increasing parity, this is the same as the findings in a study done in Italy.[19]

Despite having showed by several studies that obesity at the start of pregnancy is a predisposing factor to GDM, majority of the patients in this study were below 90 kg. This is contrary to the studies conducted in Jos,[17] southeast Nigeria,[20] Africa,[10] Trabzon and Iran. This is likely due to the fact that only weight and not Body Mass Index (BMI) was considered in this study, making it less reliable. The main associated factor for GDM in this study was family history of diabetes mellitus, which has been shown to be a strong risk factor for GDM.[8,10,21] This is similar to findings in a study done in African and one done in Iran but differs from the one done in Jos that had previous fetal macrosomia as the major risk factor. History of GDM in previous pregnancies was also found to be significant in this study just as it is in a study done in Turkey, and it is known that previous GDM is one of the strongest predictors for GDM.[10] Studies have shown that GDM increases the risk of fetal macrosomia, pre-eclampsia and polyhydramnios.[17,21,22] In this study, some of the pregnancies were complicated by PIH, while others by fetal macrosomia and IUGR. This is in tandem with the study in Turkey. GDM is known to be associated with high caesarean delivery compared to non GDM,[23] in this study however, more than half of the patients had an uncomplicated vaginal delivery. Although there was limited information about the condition of the neonates, more than half ended up being admitted into the SCBU. A study done on Asian Indian women found that GDM was associated with a higher risk for preterm birth, NICU admission and fetal macrosomia.[24] There was a significant association between the obstetric outcome and the blood sugar level. Those with abnormalities in both FBS and 2HPP had more obstetric complication than those with isolated 2HPP abnormality. But the association between neonatal outcome and blood sugar level turned out to be insignificant. This resembles the study in China[23] in a way and differs from it, in that both obstetrics and neonatal outcome were affected by blood sugar level.

Conclusions

The prevalence of GDM in this study was found to be low but still falls within the global range. The main risk factors were family history of DM and history of GDM in previous pregnancies. A significant association between the obstetrics outcome and blood sugar level found.

Limitations

The duration of the study is short, because the records of previous years were missing. This may not give the actual information about the condition studied. Many folders could not be retrieved due to poor record keeping. The authors recommend to: i) use a systematic way of tracing folders; ii) keep adequate records.

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Received: 11 September 2025; Accepted: 6 November 2025.

Contributions: all the authors made a substantive intellectual contribution. All the authors have read and approved the final version of the manuscript and agreed to be held accountable for all aspects of the work.

Conflict of interest: the authors declare no potential conflict of interest.

Funding: none.

Ethics approval and consent to participate: not applicable.

Informed consent: not applicable.

Patient's consent for publication: not applicable.

Availability of data and materials: all data generated or analyzed during this study are included in this published article.