



GESTATIONAL DIABETES: PREVALENCE, COMORBIDITIES, DRUG MANAGEMENT PATTERN AND THERAPY SUCCESS IN NIGERIAN TERTIARY HOSPITAL

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ABSTRACT

Background: Gestational diabetes mellitus (GDM) is a serious pregnancy complication, in which women without previously diagnosed diabetes develop chronic hyperglycemia during gestation. In most cases, this hyperglycemia is the result of impaired glucose tolerance due to pancreatic β -cell dysfunction on a background of chronic insulin resistance. Risk factors for GDM include overweight and obesity, advanced maternal age, and a family history of any form of diabetes. Consequences of GDM include increased risk of maternal cardiovascular disease, type 2 diabetes, and macrosomia as well as birth complications in the infant. While several management strategies exist—including insulin and lifestyle interventions, there is not yet a cure or an efficacious preventive strategy.

Objective: This study aimed to determine the prevalence of gestational diabetes, assess the comorbidities, and evaluate the influence of drug management practices, as well as ascertain the efficacy of therapy among pregnant women who attended Rivers State University Teaching Hospital (RSUTH) in Port Harcourt in the year 2022.

Method: The study was retrospective study where data used were extracted from the patients' file records of Antenatal Clinic in the Obstetrics and Gynecology department of the hospital. A sample size of 230 was obtained by calculation, and used for the study. The data extracted included details on their socio-demographic characteristics, time of diagnosis in weeks and trimesters, blood sugar level before and after treatment, in mmol/L, comorbidities present, treatment employed, maternal and fetal outcomes. Tags were placed inside of each mother's folder to make quick and easy identification possible. This was done with a data collection form. **Results:** A total of 4,764 pregnant women accessed care within the study year, of which 572 of them had GDM from the records. The prevalence of gestational diabetes was obtained as 11.99%. The mean age of the study group was 33.59 ± 10.10 years; Mean weight of the group was 89.11 ± 8.9 kg; Mean BMI of the group was 26.44 ± 4.5 kg/m²; Mean sugar level of the group on diagnosis was 10.74 ± 1.3 mmole/l while the mean level after treatment was 6.39 ± 1.30 mmole/l. Most (189)(82.17%) employed treatment protocol was diet + exercise+ metformin/glimepride + insulin; of which maternal outcome was 82.7% term delivery, 8.7% Cesarean delivery and 4.35% preterm delivery. Meanwhile, fetal outcome had 202(87.81%) babies with normal glucose level after feeding, 3.91% had respiratory distress; 1.74% still birth and >1% transient tachypnea. While the most common comorbid condition among the group was pre-eclampsia. **Conclusion:** It can be concluded that the Rivers State University Teaching Hospital (RSUTH) is very efficient in managing gestational diabetes with 82.17% therapy success.

KEYWORDS: Gestational diabetes, Prevalence, Co-morbidity, Treatment Success.

INTRODUCTION

Gestational diabetes mellitus, often known as GDM, is a prevalent cause of hyperglycemia in pregnancy. It is estimated that GDM accounts for around 90% of all diabetic pregnancies. Women who have gestational diabetes mellitus are at a higher risk of maternal and fetal morbidity and mortality, all of which are preventable if the condition is diagnosed and treated early.^[1] Gestational diabetes mellitus (GDM) is a frequent

metabolic condition during pregnancy and is linked to unfavorable short-term and long-term pregnancy outcomes for both mothers and their off-springs. GDM increases perinatal morbidity. These women have a high risk of diabetes and heart disease later in life. According to a meta-analysis of 20 studies and 1,332,373 individuals 67,956 women with GDM and 1,264,417 controls, women with a history of GDM have a nearly 10-fold higher chance of developing type -2 (T2DM) than

those with normoglycemia during pregnancy.^[2] Offsprings of GDM mothers are at risk for macrosomia, neonatal hypoglycemia, hyperbilirubinemia, neonatal respiratory distress syndrome, childhood obesity, and adult cardiovascular disease. Over the past couple of decades, there has been a discernible rise in the incidence of GDM in the city of Port Harcourt.^[3] The growing incidence of type 2 diabetes in Port Harcourt has resulted in a significant increase in the city's sociological, economic, and health-related burdens, at both the population and the individual level.^[2] Mothers with GDM are at risk of developing gestational hypertension, pre-eclampsia and termination of pregnancy via Caesarean section.^[4] In addition, GDM increases the risk of complications, including cardiovascular disease, obesity, and impaired carbohydrate metabolism, leading to the development of type 2 diabetes (T2DM) in both mother and infant.^[5,6,7] The increase in the incidence of GDM also leads to a significant economic burden and deserves greater attention and awareness.^[8]

Although diagnosis criteria continue to be ambiguous, treatment for gestational diabetes has been shown to enhance both mother and newborn health.^[9] Early screening and diagnosis of GDM prevents maternal and fetal adverse outcomes.^[10] Studies^[11,12,13] showed that the prevalence of GDM is highest in the Middle East and some North African countries, where it has a median of 15.2% and an interquartile range of 8.8–20.0%. This is followed by South-East Asia, which has a prevalence rate of 15.0% and an interquartile range of 9.6–18.3%, the Western Pacific, which has a prevalence of 10.3% and an interquartile range of 4.5–20.3%, South and Central America, which has a prevalence of 11.2%. In Europe, the prevalence of GDM is 6.1% on average, however it can range anywhere from 1.8–31.0%. This region also has the widest fluctuation in prevalence. Even within each region, there is a significant amount of variance that may be observed, both within and between nations. As an illustration, the prevalence in the region of the Western Pacific varies from a low of 4.5% in Japan to a high of 18.0% in Singapore. On the other hand, the prevalence of GDM is generally stable across the countries that make up North America. As there are not many studies that have been conducted to determine the prevalence of GDM in Africa and South and Central America, there is an obvious need for more research to be conducted in these areas.^[14] In sub-Saharan Africa, the prevalence of GDM is variable, with a range of 0% to 13.9% in some areas.^[15,16,17] Women with GDM make up 61.0% of the total number of women with diabetes mellitus. In Nigeria various studies have reported varying prevalence of GDM. Reported prevalence rate of GDM varies from 1-14%.^[18] A study in Abakaliki Ebonyi State, South-Eastern Nigeria reported prevalence of 4.80%, while another study in South-South region of Nigeria reported 2.98 per 1000 pregnancies and a study in Ibadan South-West Nigeria reported a prevalence of 4.90% for their prospective study participants and 1.60% for their retrospective study participants^[19,20] Several risk

factors for gestational diabetes have been established through epidemiological research. These risk factors include advanced maternal age, ethnicity, a history of gestational diabetes in the past, and a family history of type 2 diabetes mellitus (T2DM). Despite the fact that the focus has traditionally been on risk factors discovered after pregnancy, there is research to support the essential role that risk factors play during the periconception and preconception periods in the development of GDM.^[14] The data regarding prevalence of GDM and the number of women affected are important to allow for rational planning and allocation of resources and the preventive strategies that may be undertaken in future.

The purpose of this study was to assess the prevalence of gestational diabetes, assess the comorbid conditions, and evaluate drug management practices and determine the success of the therapy in gestational diabetic women who access antenatal care in Rivers State University Teaching Hospital.

Method

Study area, Study population, Study design

This research was carried out in the Rivers State University Teaching Hospital (RSUTH), which is a tertiary hospital that is owned and funded by the state government of Rivers State. Patients are expected to pay directly for services, with a few exceptions made for those who participate in the National Health Insurance Scheme. It provides emergency obstetric treatments to women who have been referred from other centers. Additionally, it provides antenatal care and delivery services for pregnant women who have been booked with the hospital, regardless of the level of risk that they face. The hospital is well-equipped, and there is a qualified medical staff on hand, including obstetricians, pediatricians, and anesthetists. The hospital provides services for both the laboratory and the blood bank for patients to utilize. The participants in this study were recruited from the antenatal clinic, which operates five days a week during regular business hours. On an average clinic day, there are approximately twenty pregnant women who sign up for antenatal care. The participants in this study were pregnant women who were eligible for prenatal care and were between the ages of 24 and 28 weeks long in their pregnancies. The last menstrual period (LMP) of each woman was used in conjunction with an ultrasound examination performed in the hospital during the first trimester to determine the gestational age of the fetus. After receiving the necessary ethical clearance from the Hospital Research Ethics Committee of RSUTH, the data used were retrieved from the Antenatal Clinic in the Obstetrics and Gynecology department, the endocrinology department from the file record office where patients' files were stored.

The information gathered about the study group include details on their socio-demographic characteristics, time of diagnosis in weeks and trimesters, blood sugar level

before and after treatment in mmol/L, comorbidities present, treatment employed, maternal and fetal outcome. Tags were placed inside of each mother's folder to make quick and easy identification possible.

The study population included adult pregnant women with gestational diabetes aged, 18 – 46 years who accessed care in the Obstetrics and Gynecology department in RSUTH in the year 2022.

Sample size, Sample size calculation

For the purposes of this investigation, the ideal sample size was one that had a degree of accuracy of 5% and a confidence interval of 95%. The significance of the analysis was based on a prior study that had found the prevalence of gestational diabetes to be 6.8%. The formula that was used to determine the sample is as follows:

Sample Size; $n = [Z^2 \times p \times (1-p)/e^2] / [1 + (Z^2 \times p \times (1-p)/e^2 \times N)]$

Where n is the desired minimum size, Z is the score for the 95% confidence interval, which is 1.96, p is the standard of deviation of women with gestational diabetes mellitus from the previous study, which is 50%, which is 0.5; e is the margin of error, which is 5%, which is 0.05 and; N is population size, which is 572 (pregnant women with gestational diabetes who accessed care in the clinic in 2022). The result of which was, n equals 229.8 approximated to 230, used for the study.

Data collection

The data used were extracted from the Antenatal Clinic in the Obstetrics and Gynecology department, the endocrinology department, in the file record office where patients files are being held after acquiring the required ethical permission from the Hospital Research Ethics Committee of RSUTH. This was done with a data collection form.

Inclusion criteria: Pregnant women aged 18 – 46 years; Pregnant women with Gestational diabetes

Exclusion criteria: All pregnant women without Gestational Diabetes

Ethical approval was obtained from the Hospital Research Ethics Committee of Rivers State University Teaching Hospital.

The data retrieved were analyzed in respect to the research objectives of this study which include: The prevalence of GDM among pregnant women who accessed antenatal care in Rivers State University Teaching Hospital in 2022 Comorbidities present in the pregnant women with gestational diabetes who accessed care in RSUTH in 2022. The drug management pattern and therapy success among GDM women who accessed care in RSUTH in 2022. Maternal and fetal outcomes of GDM among the study group.

RESULT

Prevalence of Gestational Diabetes among pregnant women who visited Rivers State University Teaching Hospital (RSUTH) in 2022

The antenatal records for 2022 were perused through and the total number of pregnant women both new patients and returning patients who accessed care in the antenatal clinic was recorded, along with the number of pregnant women with gestational diabetes reporting for antenatal care each day. The total number of pregnant women without Gestational diabetes was recorded and the total number of pregnant women with Gestational diabetes was also recorded. These data are presented below and with this, the prevalence was calculated.

Calculation of the Prevalence of Gestational Diabetes Patients Visiting RSUTH in 2022

Prevalence = Total Number of GDM Patients / Total Number of Pregnant Women

Prevalence = $572 / 4,767 \times 100 = 11.99\%$

The Socio-demographic characteristics of GDM patients recorded during the course of this study include Age, Weight, Body Mass Index, Ethnicity and Occupation. These characteristics are shown in Figs 1 to 4

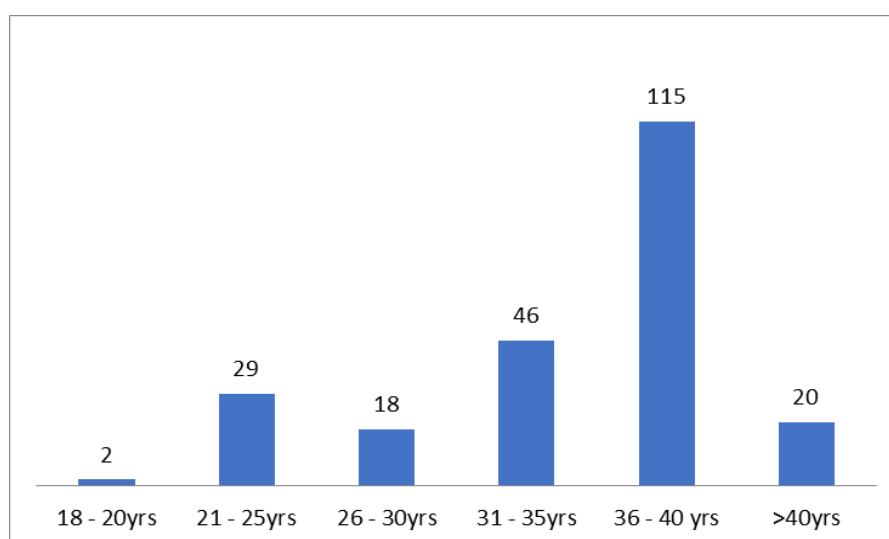


Fig. 1: Age distribution among the studied gestational diabetes women.

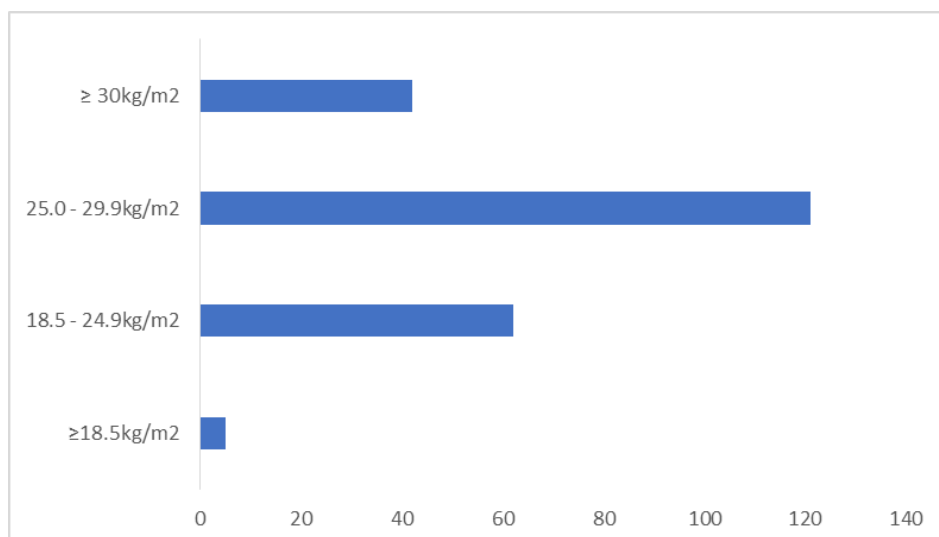


Fig. 2: Body Mass Index (BMI) distribution for the study group with GDM.

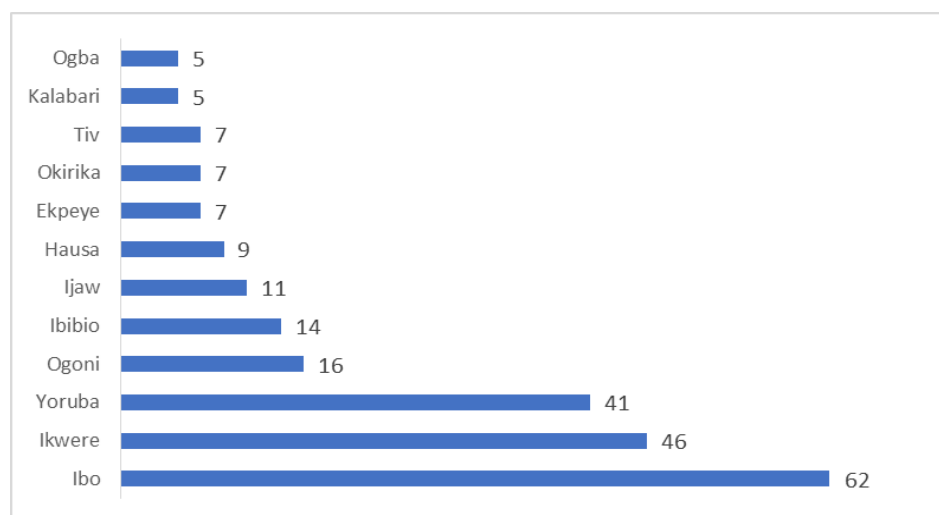


Fig. 3: Various Ethnic groups among the study group Women with GDM.

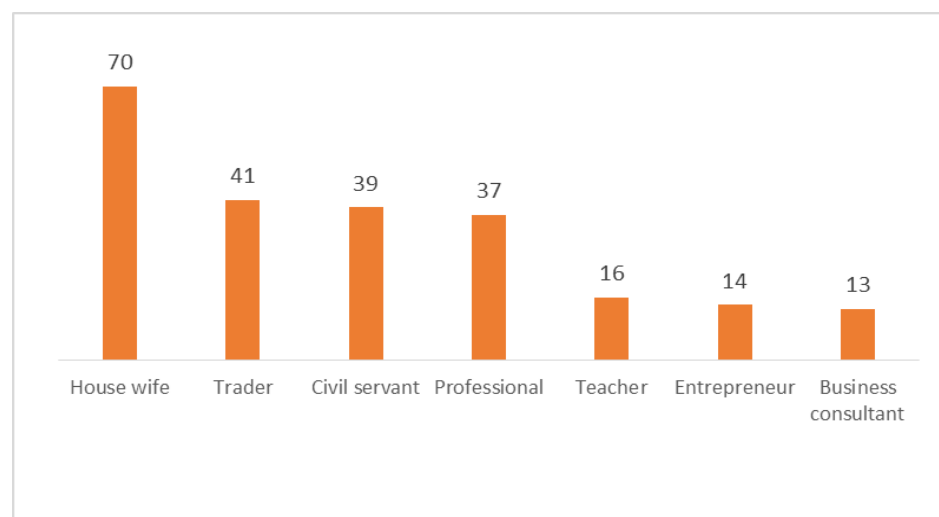


Fig. 4: Various occupation of the study group of pregnant women with GDM.

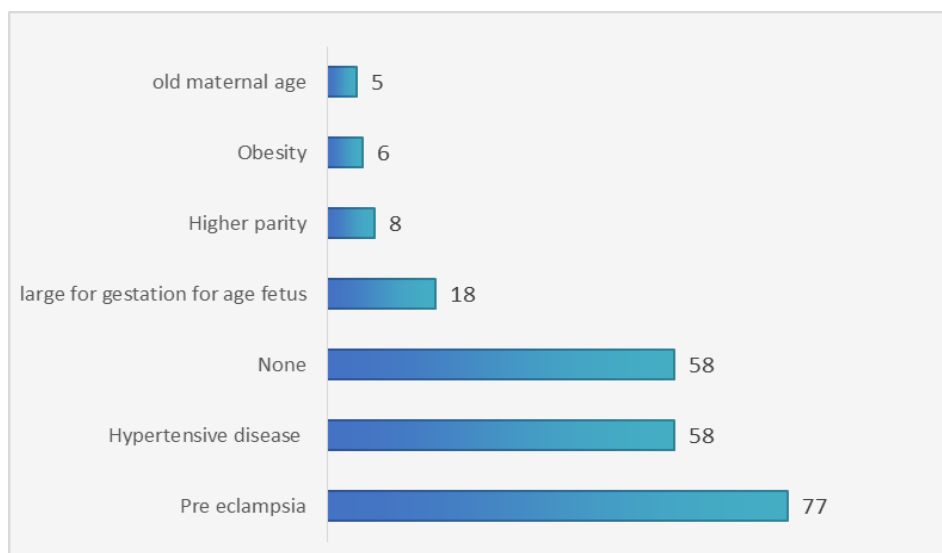


Fig. 5: Frequency of Comorbidity among study group with gestational diabetes.

Pre eclampsia is the commonest co-mordid complication, among the study group, followed by hypertension.

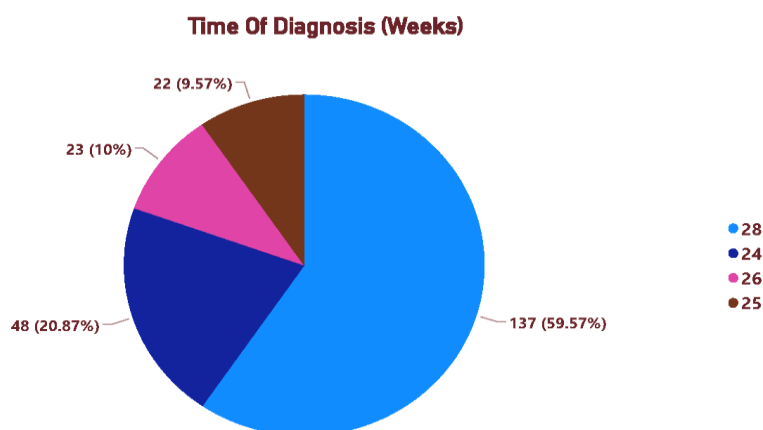


Fig. 6: Time of diagnosis of the diabetes in Trimester among the study group.

Most 137(59.57%) gestational diabetes mellitus cases were diagnosed at 28 week of gestation.

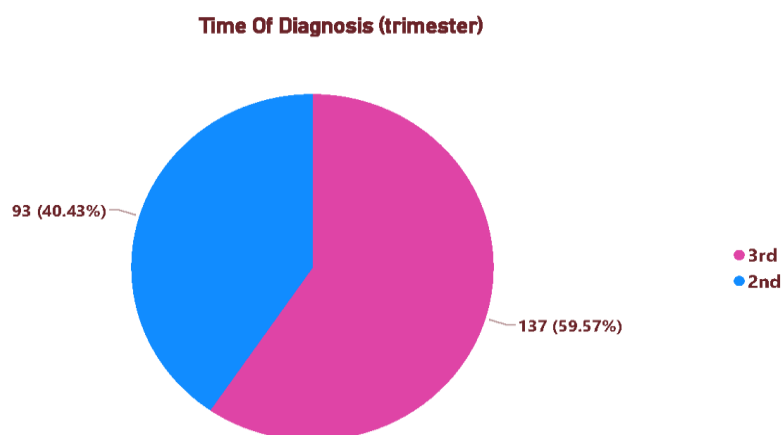


Fig. 7: Time of Diagnosis of diabetes among the study group in Trimesters.

The result further showed that most diagnosis was in the third (3rd) Trimester

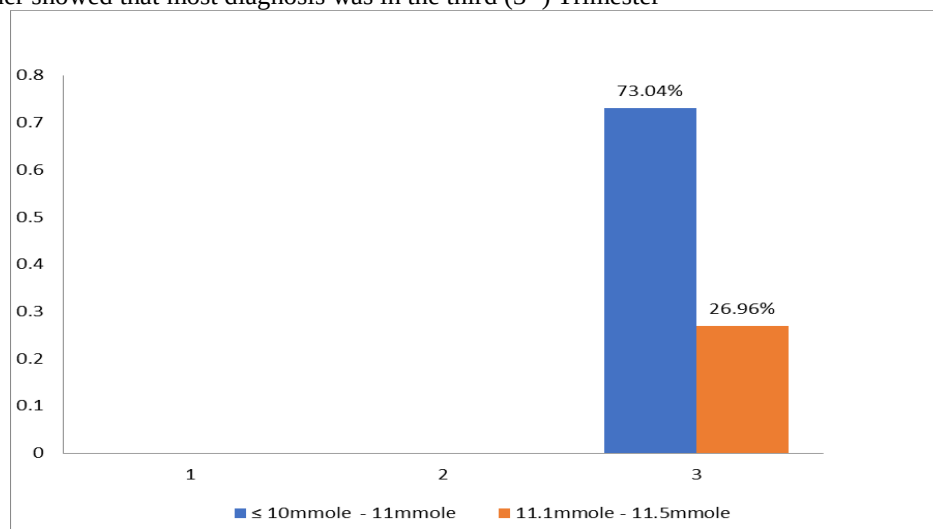


Fig. 8(a): Mean Blood sugar level of study group at time of diagnosis.

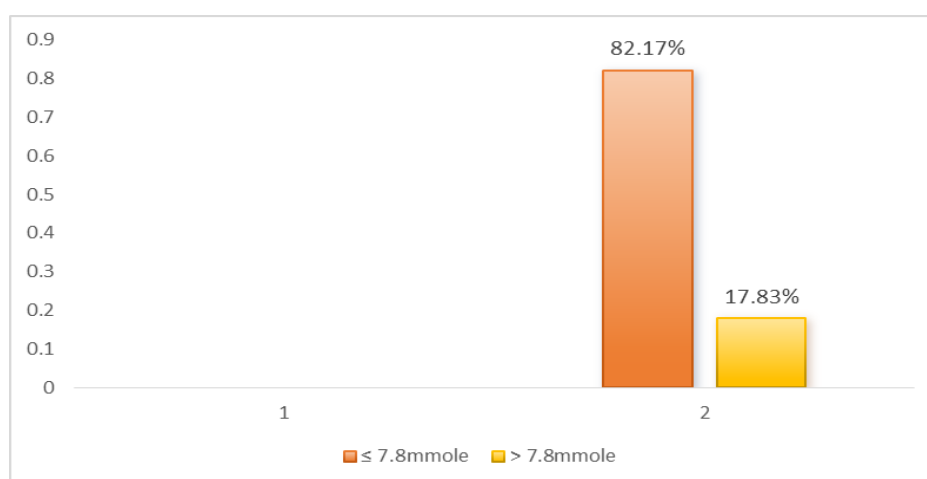


Fig. 8(b): Mean Blood Sugar level of the study group after Treatment.

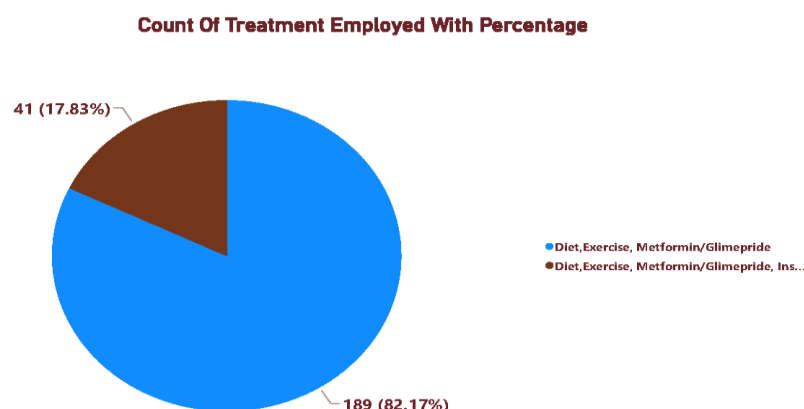


Fig. 9: Treatment employed in the management GDM among the study group.

Most 189(82.17%) common treatment employed in RSUTH for the management of the gestational diabetes among the study group was: Diet; Exercise; Metformin/Glimepride. Insulin is included among the few 41 (17.83%) who were not responding effectively.

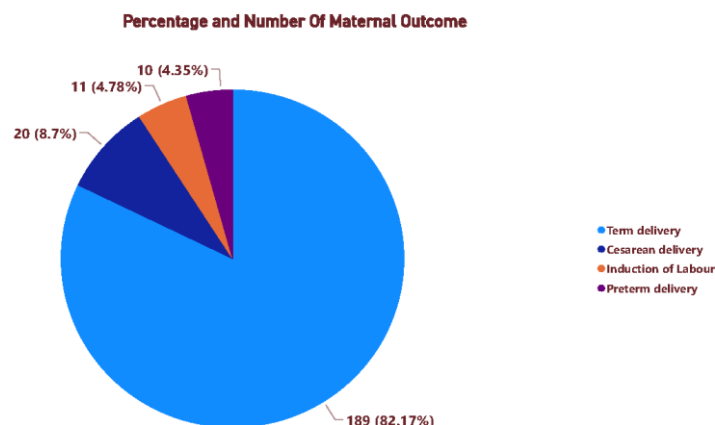


Fig. 10: Maternal Outcome after treatment among the study group.

The result showed that majority, 189 (82.17%), of the mothers had term delivery, with only 10(4.35%) pre-term delivery and 8.7% (20) by Cesarean section delivery.

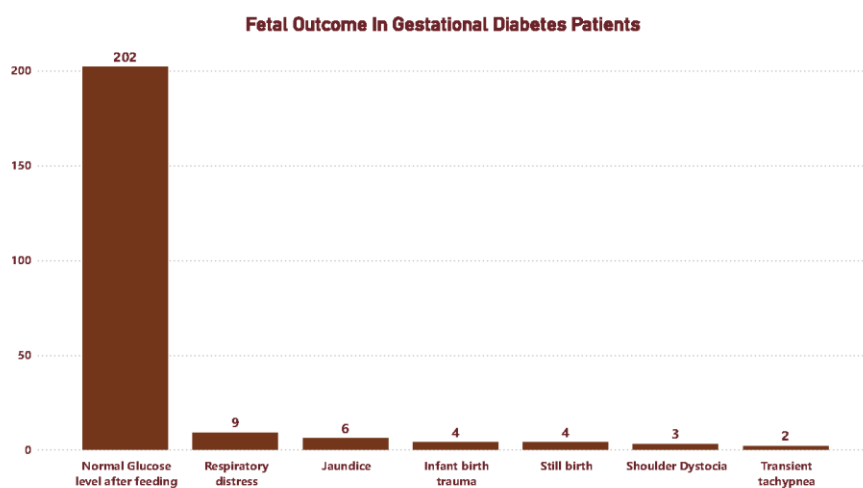


Fig. 11: Fetal Outcome among the study group with gestational diabetes mellitus.

The result showed that most of the infants had normal glucose level after feeding, with transient tachypnea being the least outcome among the infants, while respiratory distress were few in number.

DISCUSSION

In this retrospective study, the prevalence of Gestational Diabetes Mellitus (GDM) among pregnant women who visited RSUTH in 2022 was calculated to give 11.99%. The total number of GDM patients that visited RSUTH in 2022 was 572, while the total number of pregnant women that accessed antenatal care in the Unit in 2022 was 4,767. The percentage of the ratio of 572 to 4,767 gave a prevalence of 11.99%. This result is higher than prevalence in another tertiary hospital in India.^[21] Prevalence of gestational diabetes mellitus (GDM) is known to vary widely depending on the region of the country, dietary habits, and socio-economic status.^[22] The increasing prevalence in developing countries is related to increasing urbanization, decreasing levels of

physical activity, changes in dietary patterns and increasing prevalence of obesity.^[23,24,25,26,27,28]

The socio-demographic characteristics of GDM patients recorded during the course of this study include age, weight, body mass index, ethnicity and occupation. The analysis showed that age 36 to 40 had the highest occurrence of Gestational Diabetes with 115 cases while age 21 to 25 showed the least occurrence of Gestational diabetes with 29 cases. BMI range 25 to 30 had the highest occurrence of Gestational Diabetes with 111 cases while BMI range 30 to 35 showed the least occurrence of Gestational diabetes with 42 cases. The Ibo tribe had the highest occurrence of Gestational Diabetes with 62 cases while the Ogba and Kalabari tribe showed the least occurrence of Gestational diabetes with 5 cases each. For occupation, house wives had the highest occurrence of Gestational Diabetes with 70 cases while age, business consultant, showed the least occurrence of Gestational diabetes with 13 cases.

The time of diagnosis was analyzed in both weeks and trimesters. The analysis showed that 28 weeks had the highest occurrence of Gestational Diabetes patients with 137 cases at 59.57% while 25 weeks had the lowest occurrence of Gestational Diabetes patients with 22 cases at 9.57%. In trimester, it showed that the third trimester had the highest occurrence of gestational diabetes patients with 137 cases at 59.57% while the second trimester had the lowest occurrence of gestational diabetes patients with 93 cases at 40.43%.

The mean blood sugar level of all subjects was above 7.8mmol/dl at the time of diagnosis before treatment. After treatment, the mean blood sugar level of 189(82.17%) subjects dropped below 7.8mmole/dl while the blood sugar level of 41 (17.83%) patients remained above 7.8mmole/dl.

The patients were treated with the standard guideline for gestational diabetes treatment. All patients were placed on a diet, encouraged to exercise and treated with Metformin/Glimepride. Patients whose blood sugar level remained above 7.8 after initial treatment, insulin was prescribed and administered to them.

Several maternal outcomes including term delivery, Cesarean delivery, induction of labor and preterm delivery were recorded, however, term delivery had the highest occurrence of 189 cases with 82.17% while preterm delivery had the lowest occurrence of 10 cases with 4.35%

Several Fetal outcomes including normal glucose level after feeding, respiratory distress, jaundice, infant birth trauma, still birth, shoulder dystocia and transient tachypnea were recorded, however, normal glucose level after delivery had the highest occurrence of 202 cases while transient tachypnea had the lowest occurrence of 2 cases.

Standard treatment guidelines

The treatment guidelines adhered to in RSUTH is as follow: Diet; Exercise; Oral Hypoglycemic Agents such as Metformin/Glimepride; In severe cases, Insulin is prescribed and administered.

The physician refers severe cases to the endocrinology department, where further diagnosis, treatment and counselling were carried out.

CONCLUSION

It can be concluded that the Rivers State University Teaching Hospital (RSUTH) is very efficient in the management Gestational Diabetes with 82.17% treatment success.

Authors' contributions

The first author developed the idea. The second author reviewed the literature and collected the data. The second author analyzed the data and wrote up the manuscript.

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Conflict of interest

The authors declared no conflict of interest.

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