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Gestational diabetes and intra uterine fetal death complication in a tertiary health facility

Dr. Affi Ayuba[1*], Mutihir Josiah[2], Dr. Dalili Shabbal[3], Dr. Pam Stephen[4], Dr. Longwap AS[5]
[1] Department of Chemical Pathology, University of Jos, Jos, Nigeria
[2] Department of Obstetrics and Gynaecology, University of Jos, Jos, Nigeria
[3] Department of Chemical Pathology, College of Health Science, University of Abuja, Kuje, Nigeria
[4] Department of Radiology, University of Jos, Jos, Nigeria
[5] Department of Chemical Pathology, University of Jos, Jos, Nigeria

Abstract
Aim: To determine the prevalence of GDM and risk factors of IUFD and to determine the magnitude of IUFD complication in these women.
Background: GDM is relatively common among antenatal population in Jos.
There are several risk factors for GDM which includes family history in first degree relatives, obesity, advanced maternal age, glycosuria and selected adverse outcomes in previous pregnancy (for example still birth or macrosomia).
Still birth occurs at gestational age greater than 24 weeks, late IUFD is between 20-23 weeks and abortion occurs in gestation of less than 20 weeks. Still birth is caused by maternal, fetal or placental conditions, and may be the result of the interaction between them.
In Nigeria, the prevalence of diabetes in pregnancy (based on report from the South western parts of Nigeria) range from 0.06-0.25 percent. This study seeks to determine the prevalence of GDM in our antenatal populations and to determine the complications of pregnancies associated with GDM e.g. letal complication of IUFD.
Materials and methods: This is a prospective cross-sectional study of five hundred and sixty pregnant GDM women with age range of 20-49 years with mean age of 28 years. This study was carried out between the months of June, 2017 to May, 2018.
The weight of the subject was measured to the nearest kilogram with a Hanson type bathroom weighing scale. The height was measured to the nearest centimeter. The body mass index (BMI) was calculated and recorded.
Determination of plasma glucose by the glucose oxidase method. 3 glucose values were obtained and diagnosis based on 2 or more falling at cut off values for GDM according to the criteria given by WHO, 1999. Sampling at 0hr $\geq$ 5.8mmol/L, 1hr $\geq$ 10.0mmol/L and 2hr $\geq$ 8.5mmol/L respectively for 100g of oral glucose load
Result: The Data obtained was represented using Stata Software version 11.
The various parameters include glucose levels, table showing GDM, IUFD, History of GDM, parity and age was shown. The prevalence of GDM is 4.3%. Gestational age of less than 20 weeks (abortion) is 15.1%, at gestational age of 20-23 (late IUFD) then at >23 weeks was found to be 76%.
Prevalence of hypertension is 19.6% and 31.4% had positive history of T_2DM
Conclusion: GDM is relatively common among this antenatal population in Jos attending ANC Jos University Teaching Hospital (JUTH).
It may be possible to prevent many maternal and fetal complications by strategies such as timely screening methods and managing blood glucose in afflicted pregnant women. There are two methods for screening; universal and selective methods recommended by America Diabetes Association.
Advocacy for awareness of GDM prevalence and its complication is important.

Keywords: gestational diabetes mellitus, intrauterine fetal death, duration of pregnancy, birth of dead baby, number of children

1. Introduction

In pregnancy, physiological changes to support fetal growth development occur. In normal pregnancy there is associated increased insulin resistance (due to placental hormone e.g. estrogen progesterone) especially in the second and third trimesters. To maintain euglyceamia there is increased insulin secretion with GDM developing in those women who fail to sufficiently augment insulin. Gestational diabetes is any degree of intolerance occurring at the beginning of the first appeared during pregnancy that is not previously diagnosed diabetes [1-3]. GDM like any state of impaired glucose tolerance (IGT) is an opportunity for early medical intervention to prevent or delay the onset of every diabetes and long term complication. Overall care and metabolic control of GDM pregnancies in our population remain sub-optional with attended poor feto-material outcomes [4-6]. There are several risk factors for GDM which includes family history in first degree relatives, obesity, advanced maternal age, glycosuria and selected adverse outcomes in previous pregnancy (for example still birth or macrosomia). The rising prevalence of Diabetes mellitus and obesity is going up parallel with the prevalence of GDM [7]. Still birth occurs at gestational age greater than 24 weeks but early IUFD is less than 20 weeks and late IUFD is

between 20-23 weeks gestation. Still birth is caused by maternal, fetal or placental conditions, and may be the result of the interactions between them [8-10]. Almost half of the still births in pregestational diabetic pregnancies occur before 30 weeks of pregnancy. Maternal obesity, higher maternal age, poverty and hyperglycemia risk factors for late intrauterine deaths [11, 12]. Fetal hyperglycemia and hyperinsulinemia can cause fetal hypoxia which may lead to fetal death. GDM occurs in many women affecting 2-4% of pregnant women associated with adverse outcome for both fetus and the mother [4-6]. GDM prevalence varies from 1-14% in different countries [3]. The least prevalence has been reported from Singapore and Tanzania (<1%) and the most in Pima Indians which was more than 14% [14]. In Nigeria, the prevalence of diabetes in pregnancy (based on report from the South Western parts of Nigeria) range from 0.06-0.25 percent [8-9]. This study seeks to determine the prevalence of GDM in our antenatal population as well as to determine the complications of pregnancies associated with GDM [15]

Materials and Methods

Research Settings and Design

This study was done at the Dynamic room of chemical pathology Department of Jos University Teaching Hospital which serve as referral to neighbouring general hospitals including plateau specialist Hospital, OLA General Hospital, neighbouring State Hospital and private hospitals.
This is a prospective cross-sectional study of antenatal clients with age range of 20-49 years with mean age of 28 yrs. This study was carried out between the months of June, 2017 to May, 2018. Women who had previous diagnosis DM, and those with age above or below 20-49 were excluded. Women who had any chronic illness or unwilling were also excluded.

Data Collection and Analysis

This study was usually done between 08:00 and 15:00 hour daily in June and December of the year 2017. On arrival, each subject was allowed to rest for about 10min, a questionnaire designed for the study was administered, Socio-demographic data and history of personal habits such as smoking, alcohol consumption and physical activity were obtained.

Physical activity was assessed; the occupations of the women were determined.
Physical examination was carried out by the authors. The weight of the subject was measured to the nearest kilogram with a Hanson type bathroom weighting scale. The height was measured to the nearest centimeter. The body mass index (BMI) was calculated and recorded. Classification by BMI was done according to the recommendations of the WHO expert committee for the classification of overweight (9). Hypertension is one of the risk factors of IUFD. Venous blood (2.5 ml) was collected into fluoride-oxalate and transported to the chemical pathology laboratory of JUTH within 2hrs for the determination of plasma glucose by the glucose oxidase method. Three (3) glucose values were obtained and diagnosis based on two (2) or more values falling at cut off values for GDM according to the criteria given by WHO, 1999; sampling at 0hr ≥ 5.8mmol/L, 1hr ≥ 10.0mmol/L and 2hr ≥ 8.5mmol/L respectively for 100g of oral glucose load. Hyperglyceamia can cause fetal hypoxia leading to IUFD.

Statistical analysis

The data obtained were coded and entered into Stata Software for analysis. The data are presented as mean ± S.D. Comparison was done by student's *t*-test for continuous variables and x^2-test for discrete variables. Statistical analysis broughtout the prevalence in percentage of GDM and the magnitude in (number of IUFD) detected by radiological examination (obstetrics ultrasound).

Ethical consideration

This study was conducted with adherence to ethical standards. Informed consent was used in the recruitment of participants. Approval for this study was obtained from the Ethics Committee of JUTH; confidentiality was maintained in accordance with standard medical practice.

Result

Table 1: Characteristics of the total study sample and analytical sample

Indices (N=561)	GDM Patients	Total women	580	Occupation	% Occupation
Positive family history	176(31.43%)	To women participated	561	House wives	55
Parity >4	158(28.1%)	Age range	20-49	Traders	25
New maternal age years	28 ± 241 (18-40)	Mean age	28yrs	Civil servants	20
BP ≥ 140/90mmHg	119 (19.6%)				
GDM	24 (4.3%)				
IUFD	112(19.6%)				
	Less than 20 weeks 85% (15.1%)				
	20 to 23 weeks 50 (8.9%)				
	More than 23 weeks 7.6%				

The result in table 1 shows that the prevalence of GDM was found to be 4.3% and IUFD 19.6%.

Table 2: Shows the various percentages and types of IUFD according to their gestational ages.

Gestation Period	Population	% Population
<20 weeks gestation	85	15.1
20-23 weeks gestation	50	8.9
>23 weeks gestation	428	76

Table II shows Intrauterine fetal death at 20-23 weeks (late IUFD) was found to be 8.9% and still birth (>23 weeks) gestation was found to be 76% while IUFD at less than 20weeks (abortion) is 15.1%. Prevalence of hypertension is 19.6% and 31.4% had positive history of T_2DM.

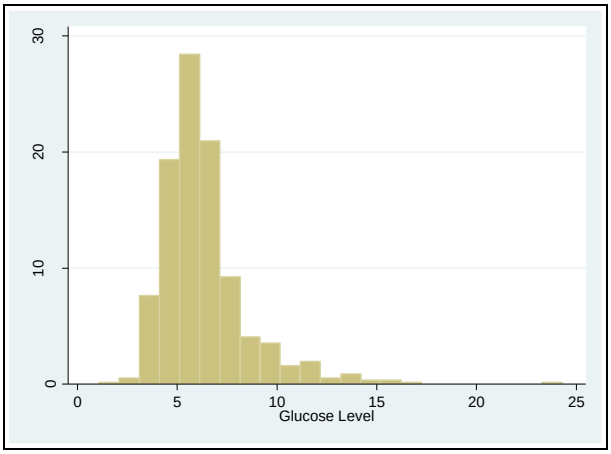

Fig 1: Histogram showing percentage of population with certain Glucose level

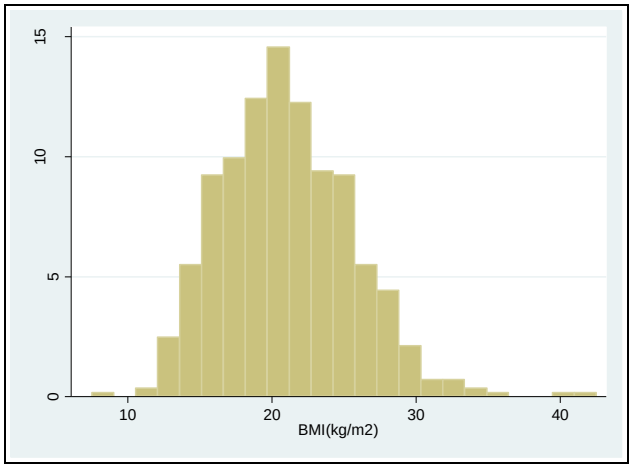

Fig 2: Histogram showing percentage of population at certain BMI ranges

Discussion

In countries like Nigeria with poor economy, lack of balanced diet, increase inclination to western diet, and poor maternal-child indices leading to poor maternal-child outcome [16]. These together with family history previous history of GDM predispose the women to GDM. This study of GDM and IUFD complicating GDM is perhaps the first in Nigeria. In recent past study of the complications of diabetes in relation to pregnancy in Nigeria did not discriminate between GDM as defined and diabetes in pregnancy (i.e. pre-pregnant diabetes) [17]. Our study had GDM prevalence of 4.3% which differ from work done in PortHarcourt (0.23%) studied about 20years ago. The rise in general prevalence of diabetes globally is parallel to the increase GDM prevalence [18]. GDM prevalence varies from 1-14% in different parts of the countries [3]. The lowest prevalence was reported from Singapore and Tanzania (<1%) and most in Pima Indians which was more than 4% [2]. This did not vary far from our works of 4.3% [14]. A reported prevalence figures for GDM in two parts of the United States are 2-3% and 2-10% respectively [17]. Another study shows a greater prevalence of 13.9% [19]. This explosion in prevalence represents serious public health challenging likely to bring considerable increase in GDM incidence [19]. From this study, IUFD was found to be 15% at gestation below 20 weeks, 8% at gestation between 20-23 weeks and for still birth 76% gestation weeks of 23 weeks and above. It was shown that IUFD prevalence was 3.8% in women aged 45years or older compared with 2.1% in women 40-44 year. In this study, it is not clear that hyperglyceamia may not be the only cause of IUFD [20]. One other cause of IUFD is the intrauterine infection, fetal congenital abnormalities, placental insufficiency, maternal hypertension and systemic maternal infection and sepsis. A study in New Zealand compares well with our work having fetal death of 3.4% (34/1000 birth). This study was observed that the rate of fetal death was higher in type 2 diabetes than type 1, 34/1000 versus 12/1000 births [21-22]. The higher rate of fetal demise in type 2 than type 1 is attributed to higher incidence of obesity, hypertension and advanced maternal age in these patients [6]. Majority of in still birth which accounts for (76%) occurs before 30 weeks gestation due to, higher maternal age, poverty and ignorance [7]. The rising prevalence of GDM and IUFD is a cause for concern in this resource dwindling and deplorable health setting common in developing nation [23]. Many IUFD throughout gestation remain unexplained. The magnitude of unexplained IUFD varies from 30% to 60% depending on the interpretation of the significant features. Cause of death determination is depending on the classification used and the interpretation. The reason for high rates of stillbirth at this center could be due to the at being a tertiary care as referral center and all major obstetric complication indentified in the periphery and other centers would be referred here. The other reason could be a high unsupervised deliveries due to various reasons like illiteracy. Low socio-economic status and the scarcity of monitoring facilities in rural areas [24-26]. Anemia is a leading cause of poor pregnancy outcome; the majority of our patients had anaemia. The increased risk of fetal death is present amongst the teenage group and older women. The western studies show that increases risk is present women over 35years of age. (14, 15, 16). In our study, however, the fetal deaths were more in the age group of 21-25 years [9]. The Incidence is a higher risk amongst poor socio-economic status. (17) Most of our patients also belong to poor socio-economic status. In summary, this study revealed high rate of still births and increasing rate of GDM prevalence.

Conclusion and recommendation

This study has demonstrated that Gestational Diabetes Mellitus (GDM) is relatively common in antenatal population attending our teaching hospital. The poor maternal child outcome due to poor economy, lack of balanced diet, family history of diabetes and previous history of GDM, there is a possibility of developing diabetes in the pregnant women. GDM patients should therefore be treated as diabetes in pregnancy with rigid metabolic control and intensive management of labour to ensure better outcome. It may be possible to prevent many maternal and fetal complications by strategies such as timely screening methods and managing blood glucose in afflicted pregnant women. There are two methods for screening; universal and selective methods recommended by America Diabetes Association. Advocacy through media and health education for awareness of GDM prevalence and its complication is

important.

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