GESTATIONAL DIABETES IN A TERTIARY HEALTHCARE CENTRE IN SOUTH WESTERN NIGERIA
A FIVE YEAR RETROSPECTIVE REVIEW

SUMMARY

Background

Women with gestational diabetes are at increased risk of adverse perinatal and maternal outcome. Hence early detection and management of the condition is vital to ensure a better outcome for both mother and baby[1,2].

Approximatly 7 % of all pregnancies are complicated by diabetes mellitus, resulting in more than 2000000 cases annually.[1] The prevalence may range from 1 to 14% of all pregnancies , depending on the population studied and the diagnostic test employed [8,9].

In the recent years, there has been a rapid rise in the prevalence of diabetes in pregnancy. This is due to the increasing number of women in the reproductive age population with pre-gestational diabetes(type 2 DM) and increase in the number of women being diagnosed with gestational diabetes[2].

AIM: To determine the incidence of gestational diabetes at Federal Medical Centre,Abeokuta and to evaluate the feto-maternal outcome of their pregnancies.

MATERIALS AND METHODS

This study is a 5 year retrospective review of gestational diabetes mellituscases at the Federal Medical Centre Abeokuta (between 2009 to 2013) as well as the outcomes of these pregnancies .

A proforma was used to collect data from cases notes of all gestational diabetes mellitus cases diagnosed within the stated period.All pregnant women in 24 weeks of gestation and above who are considered to be at risk after undergoing preliminary clinical examination were given a 75 g oral glucose load, using the WHO standardized oral glucose tolorance test[4,5]. Gestational diabetes mellitus was diagnosed if 2 hour plasma glucose was ≥140 mg/dl.

Results: The incidence rate of gestational diabetes mellitus (GDM) was found to be 1.13%. Overall, there was a preponderance of GDM mothers with tertiary level of education (52.9%). The majority of mothers with GDM in this study ,had maternal age ≥31yrs (78.1%), increased body mass index ≥26 (83.0%) and previous intrauterine fetal death 15 (28.3%) were very commonin this study. Many of the women were multiparous (48.78%) and various complications were seen in 43.9% of mothers and 22% of the newborns. Caesareansection as the mode of delivery was significantly high at 61%.

Conclusion: The morbidities associated with gestational diabetes are still enormous and timely screening of mothers could be beneficial in reducing the complications seen in gestational diabetes mellitus mothers.

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INTRODUCTION

Gestational diabetes is defined as any degree of glucose intolerance of variable severity with onset or first diagnosis during the index pregnancy[1,2,5]

Based on the demographic projections made by United Nations Population Division for the year 2015, WHO issued estimates of adults with diabetes in all countries and reported that there will be more women with diabetes than men and a considerable increase in the burden of gestational diabetes especially in less prosperous countries[4].

The increasing proportion of women with type 2 diabetes mellitus with their associated risk among the present antenatal population indicates why pregnancy outcomes in women with diabetes have not appreciably improved over the last four decades[5].

Gestational diabetes is a public health concern that currently affects a large proportion of the female population and has short and long-term consequences for the fetus and the mother. It has been reported that gestational diabetes complicates 1%-4% of all pregnancies worldwide[9,10] and its incidence has been steadily rising[6].Gestational diabetes is a major cause of perinatal morbidity and mortality, as well as maternal morbidity[6].

In an age of increasing patient empowerment, the diagnosis of gestational diabetes provides a woman with the knowledge that her baby has an increased chance of complications before, during ,and after birth

(including an increased chance of obesity, and or diabetes in the future); that she herself has an increased chance of future diabetes and future pregnancies are more likely to be complicated by diabetes (gestational or otherwise)[8]. Such knowledge could be harmful if there were no opportunities to reduce these risks. However, there is now good evidence that there are fewer obstetric and neonatal complications with intensive management [6] and that future risk of developing diabetes can be delayed and possibly avoided [7].

According to NICE clinical guideline on diabetes in pregnancy, initially published in 2008, risk assessment for gestational diabetes should be undertaken at the first prenatal visit. Women with clinical characteristics consistent with a high risk of gestational diabetes (marked obesity, personal history of gestational diabetes, glycosuria, or a strong family history of diabetes) should undergo glucose testing as soon as feasible.

If they are found not to have GDM at initial screening, they are retested between 24 and 28 weeks of gestation. Women of average risk should have testing undertaken at 24-28weeks of gestation.. Low risk statusrequires no glucose testing, but this category is limited to those women meeting all of the following characteristics: Age <25 years, weigth normal before pregnancy, member of an ethnic group with low prevalence of diabetes mellitus, no known diabetes in first-degree

relatives, no history of abnormal glucose tolerance and no history of poor obstetric outcome.

In FMCA, incidence of GDM is not known and no documented study has been done to evaluate the incidence . This present study therefore was undertaken to address this issues.

AIM: To assess and determine the impact of GDM among the expectant mothers in FMCA.

OBJECTIVES: 1. To determine the incidence of gestational diabetes in an obstetric population in Federal Medical Centre, Abeokuta.

2. To assess the sociodemographic features of pregnancies complicated by

gestational diabetes mellitus.

3. To determine feto-maternal outcome of these pregnancies.

MATERIALS AND METHODS

A retrospective survey of all pregnant women with GDM who attended the antenatal clinics of the Federal Medical Centre, Abeokuta between 2009 and 2013 was carried out. Relevant informationwere obtained from the antenatal register as well as the antenatal wards, labour ward, emergency unit and the postnatal ward. Patients who had gestational diabetes were recorded down and the case notes were retrieved from the health records. Information obtained from the case notes were coded, fed

into the computer and analysed. Antenatal performance as well as maternal and neonatal outcomes were analysed.

Also the records of all patients who attended the antenatal clinic for their pregnancy at Federal Medical Centre, Abeokuta during the study period were retrieved from Health records department through the antenatal register

Screening for gestational diabetes was done usually with clinical history, urinalysis and Oral Glucose Tolorance Test. This clinical assessment include history of unexplained intrauterine fetal death, macrosomia in the previous pregnancy, polyhydramnios, family history of diabetes mellitus in the first degree relatives, maternal weight of ≥ 90kg in the index pregnancy.

Gestational diabetes mellitus is usually diagnosed in FMCA with 75g Oral Glucose Tolorance Test with 2 hours of plasma glucose value of ≥ 7.8mg(140mg) in line with WHO criteria[3,5].

The characteristics evaluated in women with GDM in this study include sociodemographic factors, family history, medical history, initial weight and body mass index, previous poor obstetric outcome, history of diabetes mellitus in the first degree relatives , symptomatology at presentation, maternal complications and neonatal outcomes .

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The data collected was entered into Microsoft Excel and analyzed. Frequencies were obtained using descriptive statistics.

RESULTS

The total number of women who booked for and attended antenatal care during the period in view were 36242.

The number of expectant mothers discovered to have GDM were 41 giving incidence rate of 1.13%.

The mean age of women with GDM were 33.2± 4.5 years and the age ranged between 21 to 50 years..

Majority , seventy (41.5 %) of the studied population belonged to age group of

31 – 35 years and only 2.4 % of the study population were 46 years and above [Table 1].]. Among all 41 females, 26.80% (11) had no formal education, 14.63% (6) were educated up to primary level of education, 19.5% (8) had secondary level of education while 34.15% (14) had tertiary level of education .[Table 1]. The preponderance of the women had gestational age of 31-35 weeks (29.3%) and only 4.9% % of the females were in 36 – 40 weeks of gestation [Table 1].

. In this study, 24.4% of the females have a positive family history of diabetes[Table II]. The women that presented with cardinal symptoms

comprised 24.4% (10) of the gestational diabetes. The other thirty one (75.6%) did not present with the cardinal symptons.

The parity of the GDM mothers showed majority were in parity of 2 consisting of 31.71% of the GDM mothers while nulliparas and grandmultiparas consist of 14.63% and 12.2% respectively (Table III).

The pregnant Out of 41 women with gestational diabetes mellitus,43.9% had varying subtle complications during antenatal, intrapartum and peurperium while only 22% of the neonates had complications during NNU admission. A significant number 85% were mormotensive, while only6 (14.6%.) ofthe females wherediagnosed with hypertension [Table IV].

In the modalities of treatment used for the treatment of GDM mothers in this study, 4.9% (2) had good glycaemic control with regular exercise, while 14.6% (6) were on diet alone(Table V). Majority comprising 70.70% (29) were had their glycaemic control using a combination of subcutaneous insulin injection and dietary modification while 14.60% (6) and 9.8% (4) were managed on dietary modification and oral hypoglycaemic agents respectively.

Out of the 41 gestational diabetes mothers , 25 (61%) had caesarean section while 1 (2.4%) had assisted vaginal delivery.Only 15 (36.6%) of the GDM mothers had normal spontaneous vaginal delivery . Caesarean section as a mode of delivery of the gestational diabetes mothers was significant.

In this study, significant number of GDM mothers comprising 37.7% were in the body mass index range of 36-40 kg/m^2 while 22% had BMI of 31-35 kg/m^2 and 24% had their BMI of 26-30 kg/m^2. Only 2.4% of the GDM mothers had BMI of < 20 kg/m^{2}and 4.9% had BMI of > 40 kg/m^2 (Figure 2).

The birth weight of babies of GDM mothers had most of the babies to be between 3.0 to 3.9kg making up 41.50% (17) , followed by 4 to 4.9kg which consists of 26.80% (11) while 4.9% (2) of the babies has birth weight between 5-5.5kg (Figure 3)

Among the past bad obstetric history seen in this study, sudden intrauterine fetal death and spontaenous miscarriage were the commonest complications constituting 28.3% (15) and 20.8% (11) of the GDM mothers(Figure 4).

TABLE I:THE AGE, EDUCATIONAL LEVEL AND GESTATIONAL AGE OF GDM MOTHERS

AGE(yrs)	FREQ	PERCENT.
21-25	3	7.30%
26-30	6	14.60%
31-35	17	41.50%
36-40	12	29.30%
41-45	2	4.90%
46-50	1	2.40%
TOTAL	41	100.00%
EDUCATIONAL LEVEL	FREQ	PERCENT.
NONE	11	26.83%
PRIMARY	6	14.63%
SECONDARY	8	19.50%
TERTIARY	14	34.15%
TOTAL	41	100.00%
EGA(WEEKS)	FREQ	PERCENT.
≤20WKS	18	43.90%
21-28WKS	9	21.95%
29-36WKS	12	29.27%
≥37WKS	2	4.88%
TOTAL	41	100.00%

MEAN AGE =33.2YRS STANDARD DEVIATION = 4.5

TABLE II :RISK FACTORS IN THE INDEX PREGNANCY

POSITIVE FAMILY HX OF DM	FREQ	PERCENTAGE
YES	10	24.40%
NO	31	75.60%
TOTAL	41	100.00%
CARDINAL SYMPTOMS OF PPP	FREQ	PERCENTAGE
YES	10	24.40%
NO	31	75.60%
TOTAL	41	100.00%
HX OF ABNORMAL GLUCOSE TOLORANCE	FREQ	PERCENTAGE
YES	19	46.30%
NO	22	53.70%
TOTAL	41	100.00%

TABLE III:PARITY AND GESTATIONAL DIABETES MELLITUS.

PARITY	FREQUENCY	PERCENT.
0-1	15	36.58%
2-3	20	48.78%
4-5	5	12.20%
>5	1	2.44%
TOTAL	41	100.00%

TABLE IV: COMPLICATIONS OBSERVED IN GDM MOTHERS

MATERNAL	FREQ	PERCENTAGE
YES	18	43.90%
NO	23	56.10%
TOTAL	41	100.00%
FEOTAL	FREQ	PERCENTAGE
YES	9	22%
NO	32	78%
TOTAL	41	100%
HYPERTENSION	FREQ	PERCENTAGE
YES	6	14.60%
NO	35	85.40%
TOTAL	41	100.00%

TABLE V:MODALITIES OF TREATMENT OF GDM MOTHERS.

MODALITIES OF TREATMENT	FREQ.	PERCENT.
EXERCISE	2	4.90%
DIET	6	14.60%
INSULIN+DIET	29	70.70%
OHA	4	9.80%
TOTAL	41	100.00%

FIGURE 1: MODE OF DELIVERY OF GDM MOTHERS

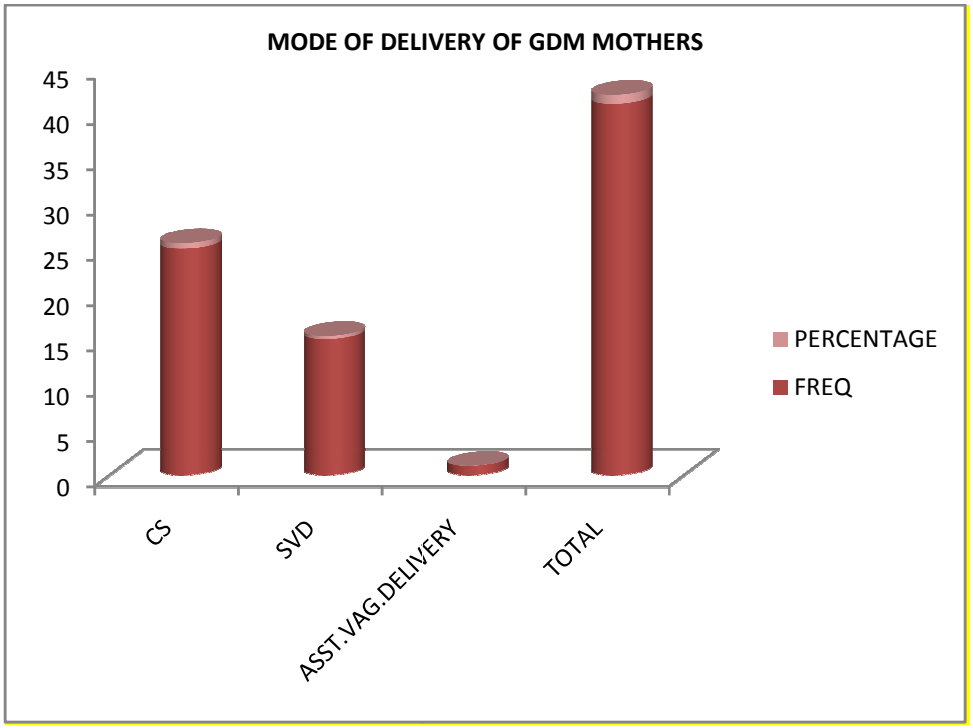


FIGURE 2: A PIE CHART SHOWING PERCENTAGE OF BODY MASS INDEX OF GDM MOTHERS

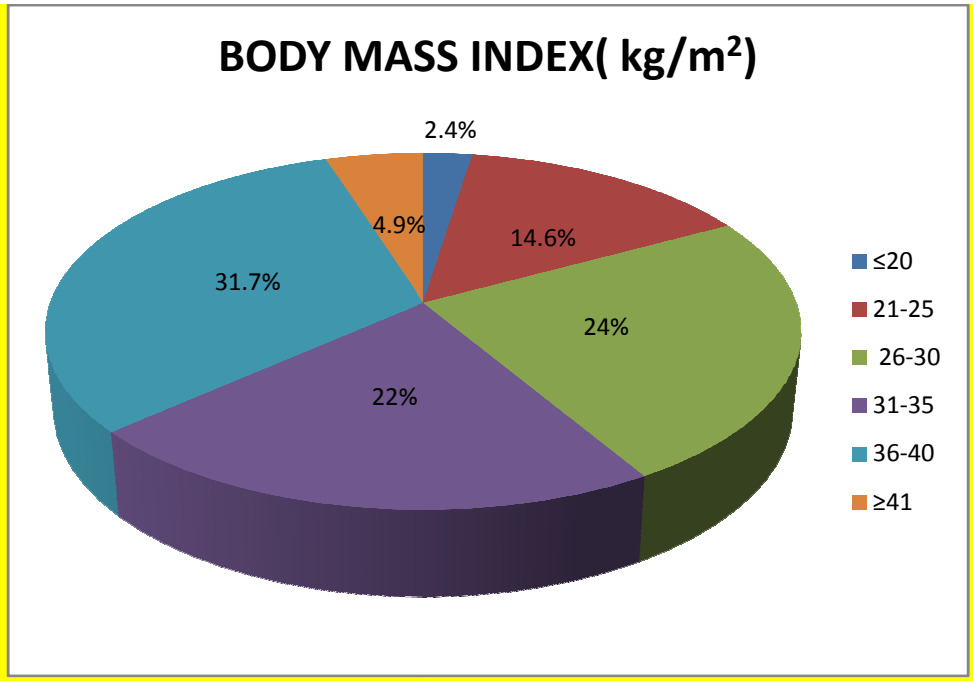


FIGURE 3: BAR CHART SHOWING THE NEONATAL BIRTH WEIGTH OF GDM MOTHERS

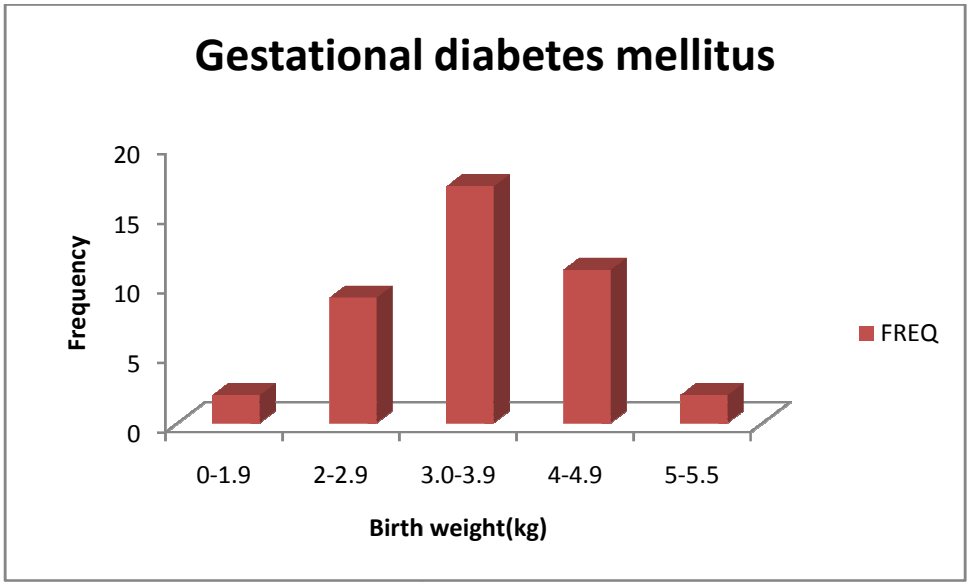
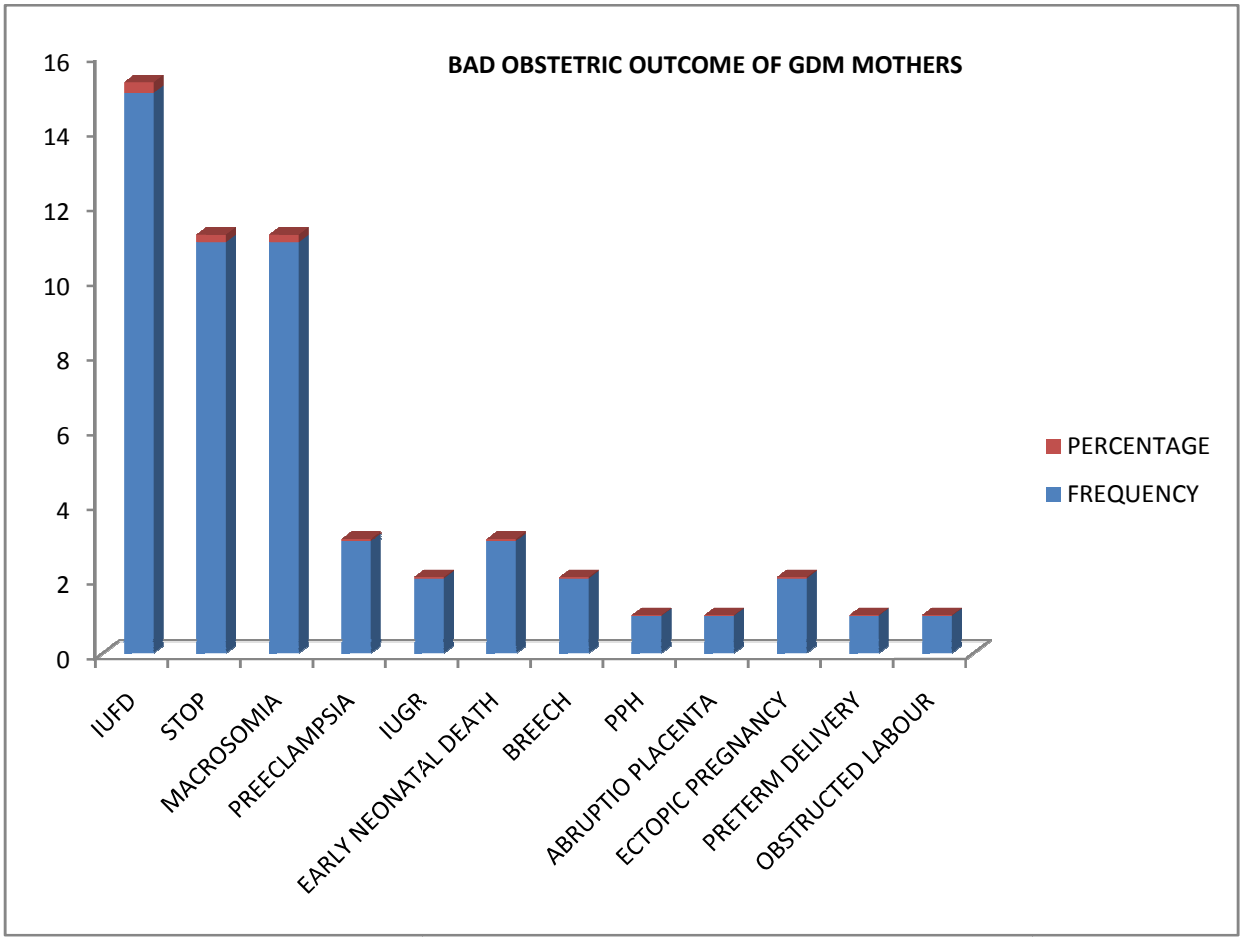


FIGURE 4: BAR CHART SHOWING PAST BAD OBSTETRICHISTORY OF GDM MOTHERS



DISCUSSION

Among the endocrine disorders affecting pregnant women, gestational diabetes has been identified as one of the commonmetabolic disorders during pregnancy[11,12]. The current definition of gestational diabetes, "carbohydrate intolerance of variable severity with onset or first recognition during pregnancy"[12,13], was first proposed by the National Diabetes Data Group (NDDG) in 1979 [8,19], although that group used the term "diabetes or impaired glucose tolerance (IGT)"[12] rather

than "carbohydrate intolerance of varying severity"[12] . The latter term was introduced at the Second International Workshop-Conference on gestational Diabetes in 1985 [19]. The significance of this change is that it acknowledges the uncertainty regarding the most appropriate diagnostic criteria. Currently, the World Health Organization (WHO) does not consider that different diagnostic criteria are appropriate for the pregnant versus the nonpregnant state, preferring instead to use the same definitions of diabetes and IGT for both situations.For decades controversies remain regarding the screening test and diagnostic criteria. Theincidence of gestational diabetes has been quoted to be between 1 to 10% depending on the population being studied[11].Studies done in anAfrican population by Ozumba et al[13] quoted a prevalence rate of 1.7%. Works done at University College Hospital, Ibadan by Fawole et al[14] gave an incidence rate of 1.6%. Other studies by Oladokun et al[14] at Ibadan and Wokomaet al [16]quoted incidence rates of <3/1000 deliveries and 2.98 per 1000 pregnancies respectively.

Some Studies done showed incidence of 1.1% by Chen eta al at Brooklyn, New york,US[17]. 2.0% by Coustan at Providence city,USA[18]. 2.5% by O' Sullivan at Boston,USA[19]. 4.6% by Berkowitz at Manhattan, New York[20]. 8.8% by Mestman at Los Angeles, Carlifornia, USA[21]. 14.3% by Benjamin at Zuni[22], India.

The incidence of GDM in our current study is 1.13% which is within the reported range in literature [10], but was less than in other

studies in [18,19,20,21,22] This difference may be related to the screening methods, diagnostic criteria used or population studied. .

More than half of the women 73.2% were literate and were residing in urban areas. This was in contrast to the work of Raja eta al at Kashmir, India [3], in which majority of the GDM mothers were illiterate females 52.9% while in our study, only 26.83% of the GDM mothers in Abeokuta had no formal education.This could be due to the location our health facility (FMCA) used in this study in an urban population.

The gestational age at diagnosis had majority of the women29.3% to be at gestational age of 31-35 weeks. This could be explained by late booking habit which could have led to making diagnosis of GDM at a later gestational age . However,some of the mothers may have first booked at the primary health facilities which may lack the manpower to make early diagnosis prior to transferring their clientship to the tertiary facility such as FMCA.

Among the various past bad obstetric history found in GDM mothers werehistory of sudden intrauterine fetal death, spontaneous termination of pregnancy and fetal macrosomia. Although other cardinal symptoms of diabetes, such aspolyuria and polydipsia were also seen among diabetic mothers our study, risk stratification in relation to gestational diabetes showed that previous bad obstetric outcome,and increased body mass index were strongly associated with gestational diabetes mellitus. Our results showed that selective screening of mothers

at risk is cost effective in detecting gestational diabetes especially in a low resource setting. However, screening of low risk pregnant women for GDM remains a controversy but that could be done at discretion of the physician and the environment of practice, all things being equal.

In some other studies [18-21], which included a group of few women at low risk of GDM, resulting in a very low incidence. This would provide evidence for an acceptable performance of the selective screening, though itmay miss some motherswith GDM in a low risk population. In the present population, mothers who were at risk met an acceptable indication for their screening.

Family history of diabetes has a strong correlation with occurrence of GDM. Our study reported a positive family history of diabetes in 24.4% % of women with GDM compared 75.6% of women with no history of GDM in their family. This result was similar to the study of Hadaegh et al [24] in which majority of the GDM mothers did not have positive family history of diabetes mellitus. Notably, the incidence of GDM is affected by previous bad pregnancy outcome. Naylor et al found glucose intolerance in 14.5% of women who had adverse obstetric outcomes [23]. In our study the number of women with GDM increased among cases who had previous intrauterine fetal death, spontaneous termination of pregnancy, history of macrosomia and hypertensive disorders of pregnancy.

High BMIduring pregnancy was considered to be a predictor for the development of GDM [18]. Studies have also shown that GDM tend to occur more frequently in women with body mass indexgreater than 25kg/m[222]. This is in agreement with results of our study.

The parity of GDM mothers in this study showed that majority of the diagnosed mothers were in the range of para 0 to para 3. In this study, it was found that the incidence of GDM decreased after the 3rd pregnancy, with much lower number of GDM mothers. It was inline with the study of Rudra et al [22] , who also found a similar pattern of decrease in incidence of GDM with progressively increasing parity. However, increased parity should be discouraged among GDM mothers because of the fact that increasing parity is associated with other diabetic risk factors like increasing age, body weight and fat deposition and could accelerate the known complications of diabetes mellitus such as retinopathy,ischaemic heart disease and nephropathy.

The various maternal complications were noted in GDM mothers during this study. These results are in concordance with other studies[20-23] , which found that pregnancy outcomes in GDM mothers had more morbidity compared to the general population of women without GDM.

However, early booking and diagnosis are to be encouraged among pregnant women because they are very essential in reducing the morbidities associated with GDM.

CONCLUSION

The consequences of undiagnosed hyperglycaemia in pregnancy should not be over-emphasised in women of reproductive age. This indicates that a high index of suspicion is required to make an accurate diagnosis of GDM early in other to prevent the considerable complications associated with late diagnosis . Thus timely action taken in screening pregnant women at risk for glucose intolerance, achieving euglycemia in them and ensuring adequate nutrition may prevent in all the probability, the vicious cycle of transmitting glucose intolerance from one generation to another and will also reduce the complications in mother as well as in child in postpartum. This study underscores the need for GDM screening in African population, which is very pertinent in reducing the morbidities associated with GDM in the pregnant population.

RECOMMENDATIONS

Guidelines and scoring system should be used in health resource poor countries,especially in the primary health care setting, which will increase the index of suspicion and accuracy of diagnosis of gestational diabetes mellitus. This will be useful in facilities in shortage of skilled medical personnel such as the primary healthcare centres and may eliminate the need for universal screening which the healthcare system

may not cope with at this present moment because of the cost, shortage of medical personnel and possibly diversion of attention from other ravaging endemic diseases such as HIV,malaria, anemia ,ebola disease (presently in some African countries) and other efforts of reducing maternal mortality through unsafe abortion and postpartum haemorrhage.

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KEY WORDS:
FMCA Federal Medical Centre, Abeokuta.GDM Gestational diabetes mellitus.BMI Body mass index.WHO World Health Organization.OGTT Oral glucose tolerance test.