

GESTATIONAL DIABETES IN A TERTIARY HEALTHCARE CENTRE IN ABEOKUTA 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}.

Approximately 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 diabetes².

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

METHODOLOGY

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 patients 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 tolerance test. Gestational diabetes mellitus was diagnosed if 2 hour plasma glucose was ≥ 140 mg/dl (DIPSI guidelines, a modified version of the WHO criterion). Tests of proportions (Chi square) and unpaired t-test were used to obtain results.

Results: The incidence rate of gestational diabetes mellitus (GDM) was found to be 1.13 % Among the risk factors associated with GDM in this study , maternal age ≥ 31 yrs (78.1%), BMI ≥ 26 (83.0%) and previous intrauterine fetal death 15 (28.3%) were very common . Among other various risk factors associated significantly with GDM were multiparity and history of spontaneous termination of pregnancy. Overall, there was a preponderance of illiterate females (52.9%). The majority of participants were civil servants (96.4%) ,though occupation did not influence the incidence of GDM.

Conclusion: The obstetric outcome in gestational diabetes mellitus patients is improved by early screening of patients at risk and their appropriate timely treatment .

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26 INTRODUCTION

27 Gestational diabetes is defined as any degree of glucose intolerance of variable
28 severity with onset or first diagnosis during the index pregnancy^{1,2,4}

29 Based on the demographic projections made by United Nations Population
30 Division for the year 2015, WHO issued estimates of adults with diabetes in all
31 countries and reported that there will be more women with diabetes than men and a
32 considerable increase in the burden of gestational diabetes especially in less
33 prosperous countries³.

34 The increasing proportion of women with type 2 diabetes mellitus with their
35 associated risk among the present antenatal population indicates why pregnancy
36 outcomes in women with diabetes have not appreciably improved over the last four
37 decades⁴. 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^{8,9} .and its incidence has been steadily rising⁵. Gestational diabetes is a major cause of perinatal morbidity and mortality, as well as maternal morbidity⁵.

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)⁷. 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 management⁵ and that future risk of developing diabetes can be delayed and possibly avoided⁶.

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, weighth normal before pregnancy, member of an ethnic group with low prevalence of diabetes mellitus, no known diabetes in first-

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

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

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

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

75 2. To assess the sociodemographic features of pregnancies complicated by
76 gestational diabetes mellitus.

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

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79 METHODOLOGY

80 A retrospective survey of all pregnant women who attended the antenatal clinics of
81 the Federal Medical Centre, Abeokuta between 2009 and 2013 was carried out.
82 Their data were obtained from the antenatal register as well as the antenatal wards,
83 labour ward, emergency unit and the postnatal ward. Patients who had gestational
84 diabetes were recorded down and the case notes were retrieved from the health
85 records. Information obtained from the case notes were coded, fed into the
86 computer and analysed. Antenatal performance as well as maternal and neonatal
87 outcomes were analysed.

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

Gestational diabetes mellitus is usually diagnosed in FMCA with 75g Oral Glucose Tolerance Test of plasma glucose value of $\geq 7.8\text{mg}(140\text{mg})$ in line with WHO criteria.

Screening for gestational diabetes was done usually with clinical history, urinalysis and Oral Glucose Tolerance 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 $\geq 90\text{kg}$ in the index pregnancy.

The characteristics evaluated 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 2.6 % of the study population was 46 years and above [Table 1]. The preponderance of the women had gestational age of 27-36 weeks (43.9%) and only 4.9% % of the females were in 37 – 41 weeks of gestation [Table I].

Overall, there was a preponderance of literate females (52.9%). Out of the women diagnosed with GDM, fourteen.threepercent (six) were nulliparous while para 2 were most seen representing 31.71% (13)[Table VI]. The pregnant females whose blood pressure were $\geq 140/90$ mmHg made up fourteen.sixpercent (6) of the GDM patients. Twenty.eightpercent of females had history of spontaneous miscarriage in the past. Many of the pregnant women constitutingtwenty eight.threepercent (15) had history of still birth in the past. Out of all the women screened that met the criteria for gestational diabetes, 24.4 % (10) had family history of Diabetes mellitus. . The mean age of mothers having gestational diabetes mellitus was 33.2 ± 4.5 years. [Table I]. Among all 41 females, 11 (26.80%) were illiterate, 6 (14.6) were educated less than high school and 24 (58.5%) received education high school and above.[Table I]. Similarly , 11 out of the 41 women having past history of abortion, 20.8% met the criteria for gestational diabetes mellitus. Among the women that had a previous bad obstetric outcome, 15(28.30%) had a history of intrauterine fetal death, which is statistically significant thereby making intrauterinefetal death 15 (28.3%) the strongest risk factor associated with gestational diabetes mellitus in this study, followed by spontaneous miscarriages 11 (20.8%), and fetalmacrosomia 11 (20.8%). In present study 24.4% of the females were having family history of diabetes[Table II]. Out of 41 women with gestational diabetes mellitus, 6 were hypertensive, constituting 14.6% while 35(85.4%) were not hypertensive. Although all cardinal symptoms of polyphagia,polydipsia ,polyuria were not present in all gestational diabetic

mothers. The women that presented with cardinal symptoms were ten (24.4%) of the gestational diabetes. The other thirty one (75.6%) did not present with the cardinal symptoms. The body mass index of majority of the gestational diabetics mellitus mothers were between 36-40 kg/m² constituting 31.7%, followed by 26-30(24%), and 31-35 kg/m² (22.00%). Out of the 41 gestational diabetes mothers , 25(61%) had caesarean section while 15(36.6%) had normal spontaneous vaginal delivery and only 1(2.4%) had assisted vaginal delivery. Caesarean section as a mode of delivery of the gestational diabetes mothers was significant.

170 TABLE 1 THE MEAN AGE=33.2 YRS STANDARD DEVIATION=4.5

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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.
ILITERATE	11	26.80%
HIGH SCHOOL	6	14.60%
>HIGH SCHOOL	24	58.50%
TOTAL	41	99.90%
GESTATIONAL AGE (WEEKS)	FREQ	PERCENT.
6-10WKS	3	7.30%
11-15WKS	8	19.50%
16-20WKS	7	17.10%
21-25WKS	3	7.30%
26-30WKS	6	14.60%
31-35WKS	12	29.30%
36-40WKS	2	4.90%
TOTAL	41	100.00%

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179 TABLE II

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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%

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182 TABLE III:

MATERNAL COMPLICATIONS	FREQ	PERCENTAGE
YES	18	43.90%
NO	23	56.10%
TOTAL	41	100.00%
FEOTAL COMPLICATIONS	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%

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185 TABLE IV:MODE OF DELIVERY AND GESTATIONAL DIABETES MELLITUS.

MODE OF DELIVERY	FREQ	PERCENTAGE
CS	25	61%
SVD	15%	36.60%
ASST.VAG.DELIVERY	1	2.40%
TOTAL	41	100%

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190 TABLE V:MODALITIES OF TREATMENT AND GESTATIONAL DIABETES MELLITUS.

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%

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199 TABLE VI:PARITY AND GESTATIONAL DIABETES MELLITUS.

PARITY	FREQUENCY	PERCENT.
NULLIPAROUS	6	14.63%
1	9	21.95%
2	13	31.71%
3	7	17.07%
4	1	2.44%
5	4	9.76%
6	1	2.44%
TOTAL	41	100.00%

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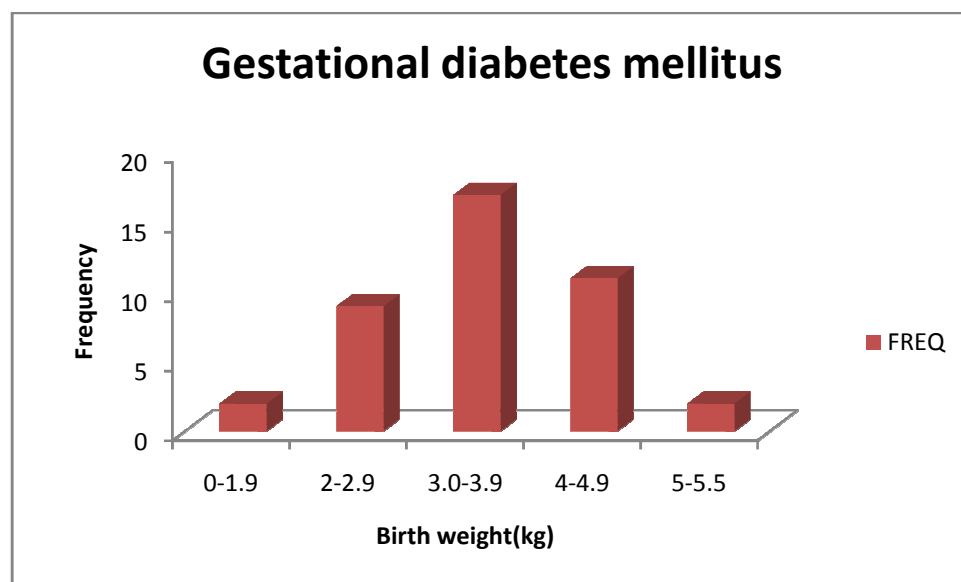
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205 BAR CHART SHOWING THE NEONATAL BIRTH WEIGHT OF GDM MOTHERS

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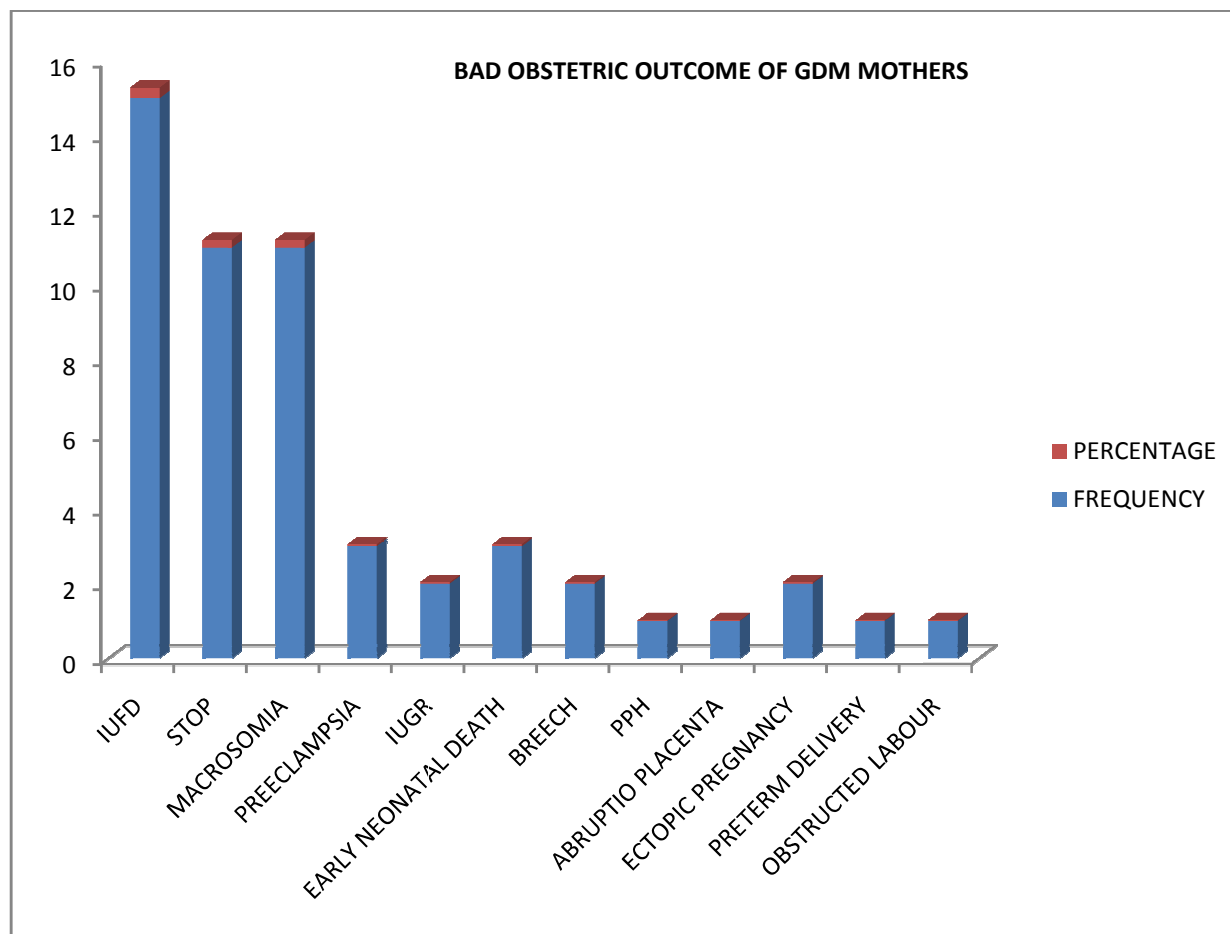
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210 BAR CHART SHOWING THE BAD OBSTETRIC OUTCOME OF GDM MOTHER

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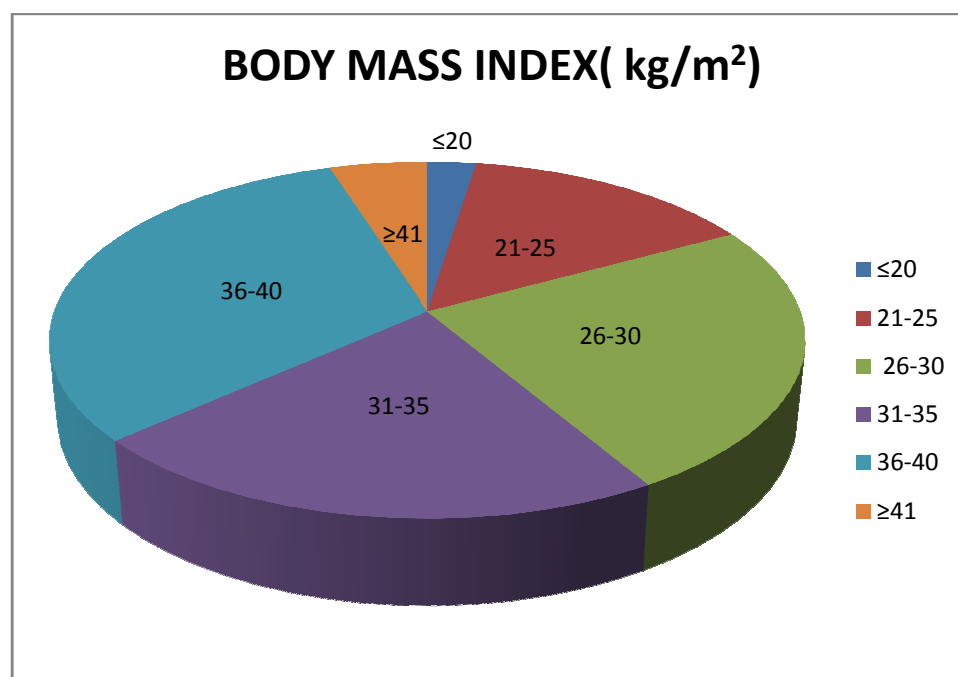
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A PIE CHART REPRESENTING BODY MASS INDEX(BMI) OF GESTATIONAL DIABETES MOTHERS



DISCUSSION

Among the endocrine disorders affecting pregnant women, gestational diabetes has been identified as the the commonest endocrine disorder during pregnancy¹⁰. The current definition of gestational diabetes, "carbohydrate intolerance of variable severity with onset or first recognition during pregnancy"¹¹, was first proposed by the National Diabetes Data Group (NDDG) in 1979 ¹², although that group used the term "diabetes or impaired glucose tolerance (IGT)" rather than "carbohydrate intolerance of varying severity." The latter term was introduced at the Second International Workshop-Conference on gestational Diabetes in 1985 ¹³. 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. The incidence of gestational diabetes has been quoted to be between 1 to 10% depending on the population being studied¹¹. Some Studies done showed incidence of 1.1% by Chen et al at Brooklyn, New York, USA¹⁴. 2.0% by Coustan at Providence city, USA¹⁵. 2.5% by O' Sullivan at Boston, USA¹⁶. 4.6% by Berkowitz at Manhattan, New York¹⁷. 8.8% by Mestman at Los Angeles, California, USA¹⁸. 14.3% by Benjamin at Zuni¹⁹, India. The incidence of GDM in our current study is 1.13% within the reported range in literature¹⁰, but was less than in other studies in¹⁸. This difference may be related to the screening methods, diagnostic criteria used or population studied. .

Majority of women were civil servants belonging to middle socioeconomic class. 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 et al at Kashmir, India³. The reason was that most of the patients were literate and have the habit of booking at the antenatal clinic between second trimester and early third trimester when they feel that their delivery is near, with the conception that tertiary health facility may be better for them, thereby abandoning the primary and secondary health facilities where primary care centres where they first visited.

Among various risk factors associated significantly with GDM were multiparity, history of miscarriage and previous intrauterine fetal death. Although other cardinal symptoms of diabetes, such as polyuria and polydipsia were also seen among diabetic mothers in our study. Risk stratification in relation to gestational diabetes showed that previous bad obstetric outcome, apart from BMI > 25 kg/m² were strongly associated with gestational diabetes mellitus. Our results showed if we did not screen low risk pregnant women for GDM we would have missed one woman with GDM. In agreement with other studies¹¹⁻¹⁴, this group included few women with a low risk of GDM, resulting in a very low incidence. This would provide evidence for an acceptable performance of the selective screening, because it would miss no more than 2.1% of GDM in a low risk population. In the present

270 population, about 97.2% were at medium/high risk for GDM , showing an
271 acceptable indication for screening.

272 Family history of diabetes has a strong correlation with occurrence of GDM. Our
273 study reported a positive family history of diabetes in 24.4% % of women with
274 GDM compared 75.6% of women with no history of GDM in their family. This
275 result compared with the study of Hadaegh et al ¹⁹. Incidence of GDM is also
276 affected by previous pregnancy outcome. Naylor et al found glucose intolerance in
277 14.5% of women who had adverse obstetric outcomes ¹⁸. In our study the number
278 of women with GDM increased among cases who had previous intrauterine fetal
279 death, spontaneous termination of pregnancy, history of macrosomia and
280 hypertensive disorders of pregnancy. High BMI during pregnancy -was considered
281 to be a predictor development of GDM ¹⁷.

282 The other studies also showed GDM tend to occur more frequently in women with
283 BMI more than 25 (83%)¹⁷. This is in agreement with results of our study. Our
284 results indicated the number of parity in GDM was higher than normal group. It
285 was inline with Rudra et al ¹⁷. It may be due to this fact that increasing parity is
286 associated with other diabetic risk factors like increasing age, body weight and fat
287 deposition. The history of abnormal glucose tolerance and previous adverse
288 outcome of pregnancy. These results are in concordance with other studies¹⁵⁻¹⁸. Our
289 finding showed universal screening remains a good method to identify women with
290 GDM at least in populations like our area with a large percentage of women at
291 medium/high risk for GDM.

292 Thus the number of gestational diabetes mothers were less as the gestational age
293 increased.

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296 CONCLUSION

297 The consequences of undiagnosed hyperglycaemia in pregnancy should not be
298 over-emphasised in women of reproductive age. This indicates that a high index of
299 suspicion is required to make an accurate diagnosis of GDM early enough, in order
300 to prevent the considerable complications associated with late diagnosis . Thus

timely action taken now in screening pregnant women at risk for glucose intolerance, achieving euglycemia in them and ensuring adequate nutrition may prevent in all 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 emphasized the need for GDM screening in African population, because the number of medium/high risk population for GDM was high and should be assessed after proper risk stratifications. A significant higher incidence of GDM was found in women with advanced age, multiparous, high BMI, and previous history of GDM or adverse outcome of pregnancy.

RECOMMENDATIONS

Modifiable risk factors for GDM in women of reproductive age should be addressed by adopting appropriate life style modifications such as increase in physical activity, decrease in consumption of beverages high sugar content and high energy dense foods should be started early in life and if possible continued throughout life. Prepregnancy weight reduction for the women with high BMI should be emphasized during the preconception period. In addition, health education among females on prevention should be extended to secondary and primary levels of health care as most of the rural population have their first contact in this centres thereby reducing morbidities and possibly maternal mortalities that could result from undiagnosed cases.

Guidelines and scoring system should be used in health resource poor countries, which will increase the accuracy of diagnosis of gestational diabetes mellitus and eliminate the need for universal screening which the healthcare system cannot cope with at this present moment because of the cost, shortage of medical personnel and possibly diversion of attention from other endemic diseases such as HIV ,malaria, anemia ,unsafe abortion, postpartum haemorrhage.

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