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Comparison of fetomaternal outcome of gestational diabetes mellitus diagnosed by who and IADPSG criteria in teaching hospital, Kerala

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Abstract

Background: Gestational diabetes mellitus (GDM) is defined as glucose intolerance with onset or first recognition during pregnancy. The prevalence of GDM ranges from 15.9- 17% among women in the state of Kerala, We compared the International Association of Diabetes and Pregnancy Study Groups and the World Health Organization criteria to diagnose gestational diabetes mellitus and compare the feto-maternal outcomes. **Methods:** This comparative study carried out from 1st of January 2019 to 31st of January 2020 at the department of Obstetrics and Gynaecology on 234 antenatal women. **Results:** The prevalence of GDM based on the present study was 6.41% and 7.69% as per the WHO and IADPSG criteria respectively .Neither significant association in the maternal/foetal complications of GDM with respect to the screening criteria nor any significant inter- group difference between the WHO and IADPSG criteria. was noted. **Conclusion:** There was no significant percentage of cases missed by the WHO screening method .More studies are needed to add evidence for better clinical screening of GDM cases in the Indian set- up.

Keywords: Gestational Diabetes, WHO, IADPSG, Feto-maternal outcome, GTT, Neonatal

Introduction

Gestational diabetes mellitus (GDM) is defined as glucose intolerance with onset or first recognition during pregnancy. The prevalence of GDM is between 6- 13% in India[1]. It affects around 7% of all cases of pregnancy across the world[2] and around 20000 cases are reported per year in America alone[3]. As per a recent study the prevalence of GDM ranged from 15.9- 17% among women in the state of Kerala[4]. Pregnancy is likely to be a critical period for appropriate interventions and actions aimed at reducing the incidence of type 2 diabetes[5]. Improving maternal health and reducing childhood mortality are two of the United Nation's eight Millennium Development Goals (MDGs). WHO currently does not have a recommendation on whether or how to screen for GDM, and screening strategies for GDM are considered a priority area for research. It states that GDM should be diagnosed at any time in pregnancy if there is 2- hour plasma glucose level of 140mg/dl 75 g oral glucose load. It has become apparent that integrated patient assessment in the first trimester using maternal history and characteristics, and biochemical tests, may better define risk for pregnancy complications including foetal abnormalities, miscarriage, stillbirth, pre-eclampsia (PE), preterm birth, gestational diabetes mellitus (GDM), intrauterine growth restriction (IUGR) and macrosomia. GDM therefore is an important determinant of the development of Type 2 Diabetes Mellitus (T2D) in both mothers and their children and thus, achieving glycaemic control during pregnancy may provide a window of opportunity to prevent and lower the burden of T2D in many generations. In this study, we compared the International Association of Diabetes and Pregnancy Study Groups (IADPSG) and the World Health Organization (WHO) criteria to diagnose gestational diabetes mellitus (GDM), so that we could propose a uniform criteria for a better and more sensitive diagnostic criteria among the women and help them avoid the further complications of GDM to both mother and the foetus.

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Aim

To compare the feto-maternal outcome of gestational diabetes mellitus diagnosed by WHO and IADPSG criteria.

Objectives

1. To compare the prevalence of gestational diabetes mellitus using the WHO and IADPSG criteria
2. To determine the foetal -maternal outcome in patients diagnosed as GDM

Materials and method

Before the start of the study, ethical clearance was obtained from the institutional review board The study was a comparative study carried out from 1st of January 2019 to 31st of January 2020 at the department of Obstetrics and Gynaecology. The sample size of the study was 234, calculated by using the following formula

n =Z2PQ/L2

Wherein= desired sample size, Z is a constant- 1.96, P = prevalence (0.05), Q=1-P and L= Allowable error i.e. 0.05.

The patients were recruited using convenience sampling. All those who agreed to provide a written informed voluntary consent were included in the study.

The inclusion criteria for the study were

1. All antenatal women in the age group of 20 -40 attending the OPD at 24 -28 weeks period of gestation
2. Able to provide a written informed consent to participate in the study.

The exclusion criteria for the study were

1. Antenatal women with a onset of diabetes prior to pregnancy or in the 1st trimester i.e Pre - gestational diabetes
2. History of major chronic illness like carcinoma, tuberculosis, renal diseases, congestive cardiac failure and liver disease.

Methodology

Before the start of the study, the patient and the accompanying relative/guardian were explained in detail about the study outcomes and the responsibilities of the patient during the study period. A detailed case history was also recorded including the name, age, BMI, medical and family history, systemic examination and then the OGTT investigation were carried out. Pregnant women at 24 -28week gestation who meet the inclusion and exclusion criteria underwent a 75-gm oral glucose tolerance test. The test was performed in the morning after 3 days of unrestricted diet. Firstly, a fasting blood sample was taken; following this the patient was advised to take 75 gm anhydrous glucose in 150 – 300 ml of water over a course of 5mins. The 2nd sample was taken 1 and 2 hr after the glucose load.

The patients were diagnosed as GDM under the IADPSG or WHO criteria

Modified criteria (WHO)[6]

The most recent WHO report ,addressing the classification and diagnosis of gestational diabetes stated that in order to determine if gestational diabetes is present in pregnant women, a standard OGTT should be performed after overnight fasting (8– 14 hours) by giving 75 g anhydrous glucose in 250–300 ml water. Plasma glucose is measured fasting and after 2 hours. Pregnant women who meet WHO criteria for diabetes mellitus or impaired glucose tolerance (IGT) are classified as having GDM. After the pregnancy ends, the woman should be re–classified as having either diabetes mellitus, or IGT, or normal glucose tolerance based on the results of a 75 g OGTT six weeks or more after delivery.

Interpretation

Impaired Fasting --110-125mg/dl ; 2 hrs --140 199mgm/dl

GDM FBS>126mgm/dl ; 2 hr >200mgm/dl or both WHO criteria- 2hour – 140mg/dl IADPSG Criteria- Fasting – 92mg/dl; 1hour – 180mg/dl; 2 hour – 153mg/dl

IADPSG consensus panel recommendations for gestational diabetes mellitus (GDM) were based on the hyperglycemia- related risk of adverse maternal and foetal outcomes. The IADPSG consensus panel recommends universal screening for GDM with a 2-h 75 g oral glucose tolerance test at 24 gestational weeks. A single abnormal glucose level on fasting, 2-h oral glucose tolerance test is sufficient to diagnose GDM. Screening high-risk women on presentation is recommended to diagnose 'overt diabetes'. These recommendations ensure the early referral of pregnant women to healthcare services for the management of cases of GDM[7].

Maternal outcomes among those with GDM like pre-eclampsia, vaginal candidiasis, polyhydramnios, preterm labour, operative vaginal delivery, Caesarean section, postpartum haemorrhage were recorded throughout the course of pregnancy.

Neonatal outcome recorded were macrosomia (birth weight > 4kg), shoulder dystocia, congenital abnormality and still birth.

These outcomes were compared between those diagnosed by WHO and those with IADPSG criteria. The plasma glucose was estimated by glucose - oxidase peroxidase method using the machine, Mind Ray BS-200.

Data analysis

The data collected was entered in Microsoft excel 2013 and cleaned for duplicates and nonentries. The Statistical Package for Social Software (SPSS) 24.0 (IBM Analytics, New York, U.S.A) was used for carrying out the analysis. The data was first checked for normality of distribution based on the Shapiro Wilk test. The data was found to be normally distributed (p= 0.0001). Chi- square test was carried out as a part of inferential statistics. All the p values
< 0.05 was considered to be statistically significant.

Results

List of tables and figures

Figure 01: Age wise distribution of the study participants

There were more cases in the present study among the 26- 30 years age group as compared to the rest.

Figure 01: Age wise distribution of the study participants

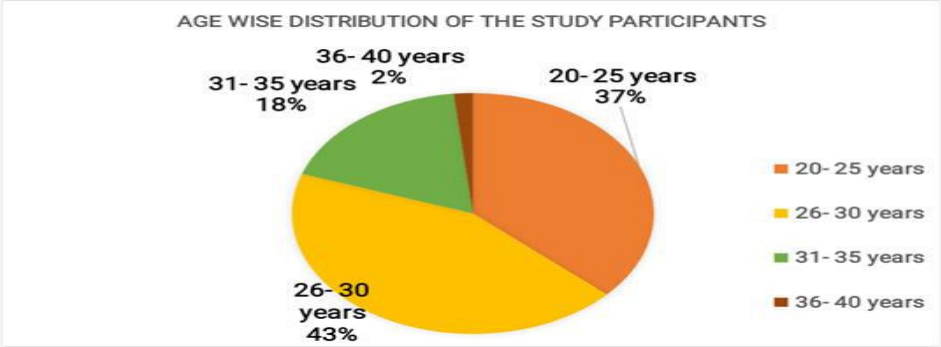


Table 01: BMI of the study participants

BMI range	Number	Percentage
<18.5	00	00
18.5- 24.9	190	81.19
25- 29.9	39	16.68
≥ 30	05	2.13
Total	234	100.00

p= 0.002267

Among the study participants patients 40 (17.09%) reported of a known history of DM in the family

Figure 2--Family history of DM in the study participants

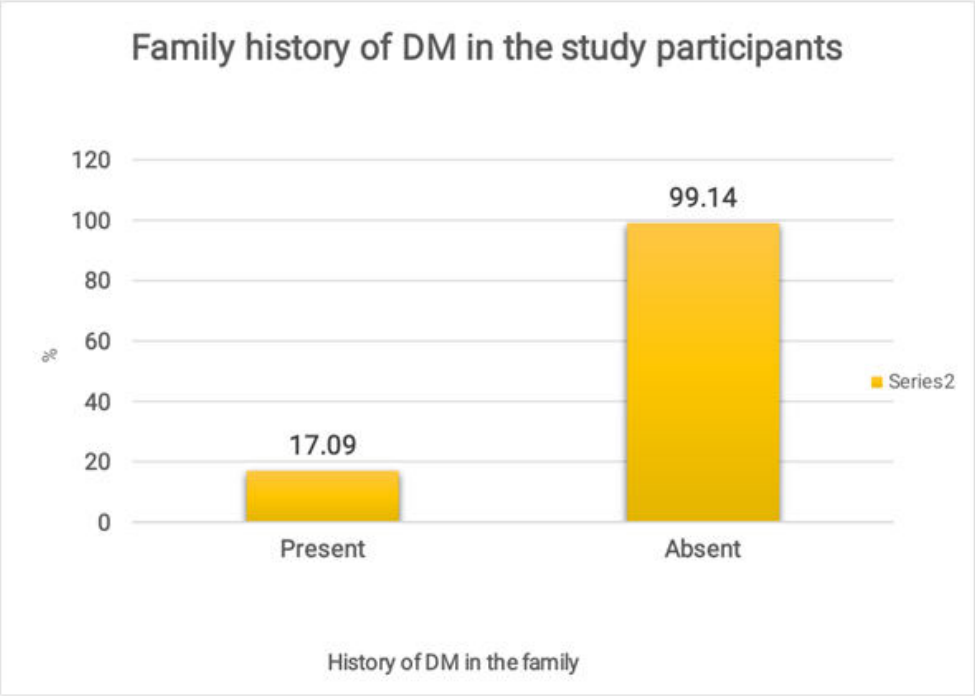
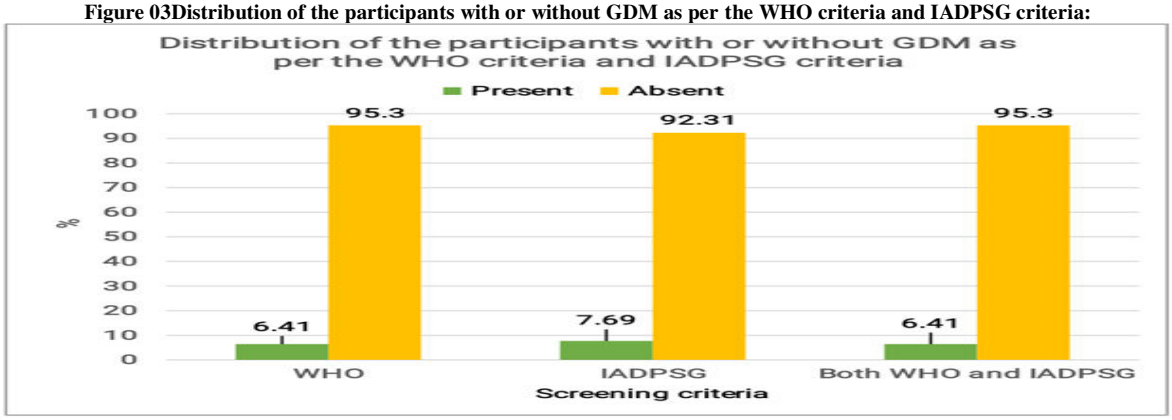


Table 02: Distribution of the participants with or without GDM as per the WHO criteria and IADPSG criteria:

Variable	WHO		IADPSG		Both WHO and IADPSG	
GDM	Number	Percentage	Number	Percentage	Number	Percentage
Present	15	6.41	18	7.69	15	6.41
Absent	219	95.30	216	92.31	223	95.30
Total	**234**	**100**	**234**	**100**	**234**	**100**

p= 0.817699

Figure 03Distribution of the participants with or without GDM as per the WHO criteria and IADPSG criteria:



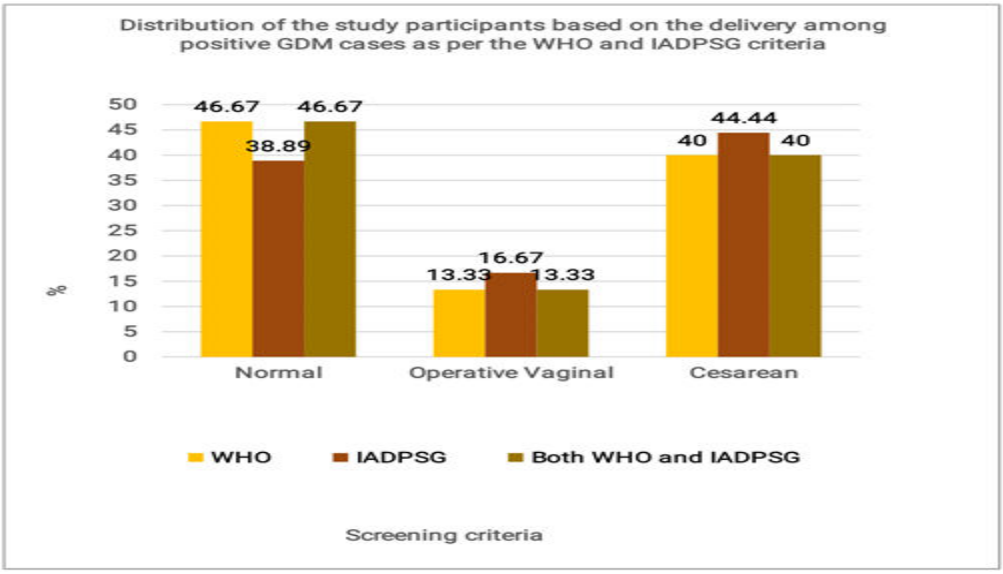
- 15 (6.41%)were identified as GDM according to the WHO criteria
- 18 (7.69%) were identified as per the IADPSG criteria.
- The difference in the two identifications was not found to be statistically significant even though the IADPSG criteria was much higher in proportion.
- All those cases identified by the WHO criteria were also identified by the IADPSG criteria as positive.
- There was a difference of 3 among both the screening criteria.

Table 03: Distribution of the study participants based on the maternal outcomes among those with GDM as per the WHO and IADPSG criteria

	WHO		IADPSG		Both WHO and IADPSG		
Maternal outcomes	Number	Percentage	Number	Percentage	Number	Percentage	
Pre-eclampsia	03	27.27	04	33.33	03	27.27	
Polyhydramnios	02	18.18	02	16.67	02	18.18	

Vaginal candidiasis	06	54.55	06	50.00	06	54.55	
Total	**11**	**100**	**12**	**100**	**11**	**100**	

Figure 4: Distribution of the study participants based on the mode of delivery among those with GDM as per the WHO and IADPSG criteria



Of the 15 cases identified as GDM by the WHO criteria-

- 07(46.67%) had normal delivery,
- 03(20.00%) had operative vaginal,
- 06 (40.00%) had cesarean surgery.

Of the 18 cases identified as GDM by the IADPSG criteria-

- 07(38.89%) had normal delivery,
- 03(16.67%) had operative vaginal delivery
- 08(44.44%) participants underwent cesarean.
- Even though there was some difference between the two criteria in cesarean cases; the difference was not found to be statistically significant.

Table 4:Distribution of the study participants based on the neonatal outcomes among positive GDM cases as per the WHO and IADPSG criteria

Variable	WHO		IADPSG		oth WHO and IADPSG	
Neonatal Outcomes	**Number**	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
Macrosomia	02	22.22	02	22.22	02	22.22
Still birth	01	11.11	01	11.11	01	11.11
Metabolic disorder	04	44.45	04	44.45	04	44.45
Shoulder dystocia	02	22.22	02	22.22	02	22.22
Total	**09**	**100**	**09**	**100**	**09**	**100**

There were overall 9 cases of neonatal outcomes that were identified by both the WHO as well as the IADPSG criteria.

- two cases (22.22) had macrosomia and shoulder dystocia,
- one was a case of still birth;
- Metabolic disorder was seen with 04 cases (44.45%) as per both the screening criteria.
- Hence the criteria do not significantly differ in terms of neonatal outcomes among the positive GDM cases.

Discussion

The present study was carried out among 234 pregnant women between 20 to 40 years of age reported to a teaching hospital.

Sample size

The sample size was lesser than study by Muche et al[8], Smidth et al[9], Black et al[10]. Larger sample size was seen in Goldman et al[11], Sakeena and Raveendran[1] ,Vij et al[12], Srinivasan and Reddi[13] and Imoh et al[14].

BMI-An American study reported of no direct association between obesity and GDM.This was beyond the scope of the present study. Further studies are needed to understand the greater impact of obesity especially in the Indian scenario.

Family history of DM

In the present, 17.9% of the participants had a family history of DM while it was 21.5% in Muche et al[8].

Prevalence

In the present study, the overall GDM prevalence was 6.4% (WHO criteria) and 7.69% as per the IADPSG criteria whereas in Muche et al the prevalence was 52.9%[8].

Another study reported of a higher prevalence as per the WHO criteria compared to the present study (7.2%); though it was carried out among a much larger population[9].

The prevalence of GDM was much higher among women in another study; where it was 12.1%; as per the WHO criteria compared to ours[15]. A higher prevalence as per the IADPSG criteria was reported by Black et al (19.4%).This was mainly because they used a larger sample size as compared to our study; though no comparison was made with any other criteria in the same study[10]. A recent study in the South India; reported that GDM prevalence was more than 65%[16] which was much higher than any other Indian study finding probably due to selection bias in Institutional based studies .According to a Nigerian study; twenty- eight participants (21.5%) had GDM by the IADPSG criteria (GDM IADPSG) and 21 (16.2%) women had GDM by the WHO criteria (GDM WHO). The prevalence was much higher than the present Indian study. Also they

reported that the prevalence as per both the criteria was 11.2%; which was in contrast to that in the present study[14]. The authors suggest the use of both the criteria for reaching a diagnosis for GDM cases.

Maternal-foetal outcomes

In the present study, the complications with respect to the maternal and foetal/neonatal outcomes were only nine cases. Of these only two cases had macrosomia and shoulder dystocia, one was a case of still birth; and metabolic disorder was seen with 04 cases as per both the screening criteria. This was lesser than the study by Muche et al[8]. They also reported PIH, induction of labour, PROM, APH, and PPH which was not found in the present study. They reported that GDM was not a significant factor to ensue induction of labour which was similar to our findings. The prevalence of hypertension was 7.3% and pre- eclampsia was 8% among GDM cases[11]. This was much higher than the findings of the present study. This could possibly be due to the selection of the sample population. In their large scale population based study Shang and Lin[17] state that interestingly, there were fewer cases of low birth weight (LBW) in the women with GDM diagnosed by IADPSG criteria or ADA criteria. Overall we did not find any significant association between the maternal/foetal complications of GDM with respect to the screening criteria; we also did not observe any significant inter- group difference between the WHO and IADPSG criteria. There was no significant percentage of cases missed by the WHO method in the present study. More studies are needed to add evidence for better clinical screening of GDM cases in the Indian scenario.according to Muche et al[8], the incidence of maternal outcome was 233 out of 694 women while Smidth et al[9], had macrosomia of 14.3% &pre- eclampsia of 5% and perinatal death -- 2.6%. Black et al[10] described significant association of GDM with maternal and foetal outcomes and also on a long term basis. Prevalence of hypertension was 7.3% and pre- eclampsia was 8% in Goldman et al[11]. Sakeena and Raveendran[4] noted profound association between GDM and DM and also post- partum depression. 50% of the DM cases at later stages in life and also in the foetal cases could be attributed to GDM as per Mishra et al[18]. There was a significant increase in lower segment caesarean section in IADPSG criteria group in this research as observed in Sangili et al[19]. In this present study there was no difference between the WHO and IADPSG criteria in terms of maternal or foetal outcome

Conclusion

The prevalence of GDM based on the present study was 6.41% and 7.69% as per the WHO and IADPSG criteria respectively. There was no significant association between the maternal outcomes and the criteria for screening. The criteria do not significantly differ in terms of neonatal outcomes among the positive GDM cases. Overall we did not find any significant association between the maternal/foetal complications of GDM with respect to the screening criteria; we also did not observe any significant inter- group difference between the WHO and IADPSG criteria. There was no significant percentage of cases missed by the WHO method in the present study. More studies are needed to add evidence for better clinical screening of GDM cases in the Indian set- up.

Limitations

The study had certain limitations:

- Smaller sample size
- Hospital based study
- Regional disparity not considered.
- Cost effectiveness was not calculated as a part of the study protocol that needs to be done in future to support IADPSG use as a daily routine in the department OPDs.

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