

## Comparison between WHO (1999) Vs IADPSG Diagnostic Criteria of Gestational Diabetes Mellitus and their Association with Maternal & Neonatal Outcome

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### Abstract

**Background:** Poor maternal & perinatal outcomes are associated with gestational diabetes mellitus (GDM). The aim of this current study was the prevalence comparison of GDM using IADPSG criteria & WHO criteria of the Indian population. We also find out associated fetal, neonatal & maternal outcome by lowering the cutoff value of IADPSG criteria vs the older criteria of WHO.

**Materials & Methods:** The prospective interventional comparative study was done involving 500 pregnant women attending the OPD for the duration of one & half years. Those who were eligible & willing to take part were subjected to a standard 75 gm OGTT between 24-28 weeks of Gestational age. Based on their report, they were selected under IADPSG or WHO criteria group. The prevalence of GDM was the primary outcome. Maternal & neonatal complications were the secondary outcome measures.

**Result:** Higher prevalence of GDM was detected when IADPSG criteria was used (31%) in respect to WHO criteria (9%). Statistically, significant difference was not found in the studied groups in relation to the occurrence of Pre-eclampsia, gestational period at delivery, mode of delivery birth trauma during delivery, incidence of neonatal sepsis, hypoglycemia, hypocalcaemia or NICU admission rate. But the significant difference was found statistically in the incidence of UTI ( $p < 0.011$ ), mean birth weight ( $p < 0.015$ ) & APGAR score at 5 minutes ( $p$ -value 0.002).

**Conclusion:** Adoption of IADPSG criteria increased the number of cases diagnosed as GDM & therefore management could be started. Overall, no major benefit was noticed related to maternal outcome & in the IADPSG group marginally better neonatal parameters were noted.

**Keywords:** GDM, IADPSG, WHO, Maternal, Neonatal Outcome

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### Introduction

Gestational Diabetes mellitus is a disorder of carbohydrate metabolism, may develop during pregnancy as there is increase in

insulin resistance which cannot be compensated and is associated with poor fetal-maternal outcome [1]. So it is of great

concern for early diagnosis by screening & manage properly to prevent adverse fetal-maternal outcomes as well as future risk of developing diabetes in the offspring [2,3].

Diabetes complicates two to five percent of pregnancies, gestational diabetes mellitus is 90% [4]. The prevalence of GDM is difficult to estimate because there are different diagnostic criteria throughout the world as well as varies with ethnicity. In India, the prevalence of GDM is around 13.9 % [5].

Due to lack of uniform screening as well as diagnostic criteria to diagnose GDM, the World Health organization (WHO, 1999) till now used similar diagnostic criteria for impaired glucose tolerance in pregnancy as the non-pregnant (FBS  $\geq$ 125 mg/dL, 2 hrs after 75 gm OGTT, plasma glucose level  $\geq$ 140 mg/dL).

Different screening or diagnostic criteria are there for GDM as proposed by different associations [6-8].

Based on HAPO Study in 2010 IADPSG, recommended new diagnostic cut-off for GDM (FBS  $\geq$ 92 mg/mL), 75 gm GTT 1 hr plasma glucose  $\geq$ 180 mg/dL, 2 hr  $\geq$ 153 mg/dL) [9].

Various studies shows conflicting result between the two groups. Lack of consensus persist regarding the best mode of diagnosis. Wendland *et al.* published a systematic review following IADPSG proposed criteria that showed similar rising trend of poor outcome of pregnancy (related to large for gestational age babies, preeclampsia & caesarean birth) in both the study groups [10].

The Atlantis Diabetes in pregnancy program which was done in Ireland that showed the GDM prevalence in the Population of Europe increased to 12.4 % when IADPSG Criteria was used in comparison to the WHO group [11].

Due to lack of similar studies in India, it necessitates a such type of study in an Indian scenario where GDM is highly prevalent so as to find out the associated fetal, neonatal & maternal outcome by lowering the cut-off values of IADPSG Criteria vs the older criteria of WHO.

## Materials and Methods

This prospective interventional comparative study which was conducted in the Obstetrics & Gynecology department of NRS MCH, Kolkata. The study was carried out on 500 pregnant women attending the OPD for the duration of one & half years. The study was initiated following institutional ethical Committee approval. All pregnant women attending the OPD in their first or early second trimester were screened for eligibility. Those who fulfilled the criteria & were willing to participate were subjected to a standard 75 gm OGTT at 24-28 weeks. Based on the reports, they were selected under IADPSG OR WHO criteria as follows:

### WHO Criteria (1999) :

- Fasting blood sugar (FBS): plasma glucose:  $\geq$ 126 mg/dL
- Glucose challenge test(OGTT with 75 gm glucose):
  - ✓ 1<sup>st</sup> hr -Not required
  - ✓ 2<sup>nd</sup> hr -plasma glucose level  $\geq$ 140 mg/dL

### IADPSG CRITERIA:

- Fasting blood sugar (FBS): plasma glucose  $\geq$ 92 mg/dL
- Glucose challenge (OGTT with 75 gm glucose):
  - ✓ 1<sup>st</sup> hr plasma glucose  $\geq$ 180 mg/dL
  - ✓ 2<sup>nd</sup> hr plasma glucose  $\geq$ 153 mg/dL

Then the patients were followed up till delivery and 48 hrs postpartum period to note any maternal & neonatal adverse outcome & complications in diagnosed cases of GDM mothers using either of the screening criteria

(WHO or IADPSG). Also, the prevalence of GDM in ether criteria was measured.

**Inclusion Criteria:** Includes pregnant mothers between 14-28 weeks of period of gestation.

**Exclusion Criteria:** Includes women diagnosed previously as Type 1 or Type 2 Diabetes mellitus or first trimester FBS < 92 mg/dl, pregnant women who refuse to participate or are unable to complete OGTT.

### Statistical analysis

Statistical analysis was done by Graphpad, Quinckes & Medcalc statistical software. Student-t-test compares the continuous

variables, Chi-square test compares the categorical variables & Statistically significant p-value was considered when it was <0.05.

### Result

Table 1: Shows demographic variables of the participants. The significant difference was not found statistically between the studied groups regarding maternal age, parity, family history or history of diabetes, body mass index, period of gestation at diagnosis & HbA1c level. Only fasting blood sugar level was statistically very significant (p-value < 0.0001) between the two groups.

**Table 1: Baseline characteristics of participants**

Variables	IADPSG n=155	WHO n=45	P values
Maternal age in years	24.85+/- 4.58	25.55+/- 4.43	0.38
Parity			0.52
Multiparous	69(44.5%)	17(37.8%)	
Nulliparous	86(55.5%)	28(62.2%)	
Family H/O of DM	53(34.2%)	21(46.7%)	0.17
Past h/o GDM	1(0.6%)	1(2.2%)	0.93
BMI(kg/m <sup>2</sup> )	22.29+/-2.18	23.97+/- 2.10	1.56
POG at diagnosis	25.20+/-1.37	25.87+/- 1.65	0.34
FBS(mg/dL)	101.23+/-8.51	132.44+/- 13.11	<0.0001
HbA1c (%)	5.50 +/- 0.23	5.64+/- 0.28	0.83

Table 2: Shows prevalence of GDM in both the study groups. Higher prevalence of GDM was detected when used IADPSG criteria (31%) in respect to WHO criteria (9%).

**Table 2: Prevalence of GDM as diagnosed by IADPSG & WHO (1999) criteria**

Study sample size (n=500)	IADPSG(n=155)	WHO(n=45)
Prevalence in (%)	31%	9%

**Table 3:** Compares the maternal outcome between the two groups. No significant difference was seen statistically between the studied groups in respect to the occurrence of pre-eclampsia, gestational period at delivery as well as mode of delivery. But significant difference was noted statistically in the incidence of urinary tract infection (p value 0.011).

**Table 3: Maternal outcome between the two groups (IADPSG VS WHO)**

Maternal Outcome	IADPSG Group (n=155)	WHO Group(n=45)	P value
Pre-eclampsia	15(9.6%)	4(8.9%)	0.87
UTI	4(2.65%)	6(13.3%)	0.011
POG at delivery	38.19 +/- 1.10	37.87+/-1.96	0.39
Cesarean section	90(58.06%)	25(55.55 %)	0.89

**Table 4:** Compares the neonatal outcome between the two groups. Significantly higher mean neonatal birth weight was noted in the neonate diagnosed with WHO criteria in respect to women diagnosed with IADPSG criteria (p value 0.015). Significant difference was found statistically in APGAR scoring at 5 minutes of the two groups (p value 0.002). No significant difference was found regarding birth trauma during delivery, incidence of neonatal sepsis or NICU admission rate. Neonatal hypoglycemia & hypocalcaemia were infrequent in either group.

**Table 4: Neonatal outcome between the two groups (IADPSG vs WHO)**

Neonatal Outcome	IADPSG (n=155)	WHO (n=45)	P Value
Birth trauma during delivery	0(0%)	1(2.2%)	0.50
Neonatal sepsis	2(1.3%)	0(0%)	0.44
APGAR score at 5 mins	8.51+/-0.68	8.04+/-0.85	0.002
Birth weight	2.57+/-0.32	2.85+/-0.42	0.015
NICU admission	12(7.7%)	5(11.1%)	0.68
Neonatal hypoglycemia	10(6.5%)	4(8.9%)	0.82
Neonatal hypocalcemia	3(1.9%)	2(4.4%)	0.68

## Discussion

In our study, 500 pregnant mothers were eligible following the screening. Among these mothers in 200 Cases, GDM was detected. IADPSG criteria were fulfilled by 155 mothers & based on WHO criteria 45 mothers were selected.

A higher prevalence of GDM was detected when IADPSG criteria was used (31%) in respect to WHO criteria (9%). A previous study was done by Imon LC *et al*, who reported 21.5% & 16.2 % prevalence of GDM in IADPSG & WHO groups respectively [12]. Similar results were found in a study done by Sagili *et al* found quite similar result in their study where the IADPSG group showed less GDM prevalence in relation to the WHO group [13].

In this current research, no significant difference was noted statistically between the studied groups in respect to past or family history of GDM. Past history of GDM followed by a family history of diabetes was one of the most significant high-risk factor related to GDM as the study covered by Nair va *et al* [14].

During our observation mean FBS was 101.23+/- 8.51 mg/dL & 132.44+/-13.11 mg/dL respectively in IADPSG & WHO groups which was significant statistically (p=<0.0001). The significance of fasting glucose level in prognosis evaluation was found in a Study done by Reyer-Munoz E *et al* [15]. This reviewed study support the option that for improvement of fetal, neonatal & maternal outcome in the IADPSG group a mean FBS level should be lower, that was also shown in our study.

The majority of the mothers in this current study diagnosis of GDM was made by OGTT at 25-28 weeks of gestation by 75 gm glucose. A gestational period should greater than 24 weeks to diagnose GDM ideally, as shown in research by Sagili H *et al* [13].

There was a statistically non significant difference revealed in the studied groups in occurrence of pre-eclampsia, urinary tract infection, gestational period at delivery as well as delivery mode. But the rate of caesarean section was increased in both the studied groups.

A higher caesarean section rate was found in some other studies [13,16]. Increased labour induction rate in GDM due to its association with poor fetal, neonatal & maternal outcome, which in turn increase the rate of caesarean section. Higher mean neonatal birth weight was detected in mothers who followed WHO criteria than the mothers who followed the IADPSG criteria (2.85±0.42 kg vs 2.57±0.32 kg in WHO & IADPSG groups respectively (p=0.015). In this study, not a single case of the macrosomic baby was born in any of the groups. Imol LC *et al* & Tahminas *et al* in their study noted a similar observation, where higher neonatal birth weight found that birth weight was seen who followed WHO criteria [12,17].

Both neonatal hypoglycemia & neonatal hypocalcemia were infrequently seen in this study in any of the groups. Hypoglycemia in a neonate was seen in 6.5% & 8.9% and neonatal hypocalcemia was detected in 1.9% & 4.4% who followed IADPSG & WHO criteria respectively. Though statistically, it was non significant in either group, hypoglycemia and hypocalcemia were more commonly seen in women who followed WHO criteria. Basri NI *et al* in a similar study found that neonatal hypoglycemia was more often in the WHO group [18].

### Conclusion

Adoption of IADPSG criteria increased the number of cases diagnosed as GDM and therefore management could be secured. Overall, no major benefit was noticed related to maternal outcome & in the IADPSG group marginally better neonatal parameters was noted.

However, studies with longer cohorts need to be compared for more authentic evidences.

**Ethical approval:** Institutional Ethics Committee approved the study.

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