Local versus International Criteria in Predicting Gestational Diabetes Mellitus-Related Pregnancy Outcomes*

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ABSTRACT

Objective: To evaluate the Philippine Obstetrical and Gynecological Society Clinical Practice Guidelines (POGS-CPG) and the International Association of Diabetes and Pregnancy Study Group (IADPSG) diagnostic criteria for gestational diabetes mellitus (GDM) against pregnancy outcomes.

Methods: This is a randomized controlled trial which enlisted patients attending the Out-patient clinic of our institution. All women included in the study were requested to take a 2-hour 75-gram oral glucose tolerance test (OGTT) between estimated 24th and 28th gestational weeks. In order to diagnose GDM, POGS-CPG consensus required a fasting plasma glucose of ≥92 mg/dl (5.1 mmol/L) or a 2-hour post-glucose load of ≥140 mg/dl (7.8 mmol/ml) while IADPSG criteria required 92 mg/dL (5.1 mmol/L) for fasting plasma glucose, 180 mg/dL (10 mmol/L) 1-hour post-glucose load, or 153 mg/dL (8.5 mmol/L) 2-hour post-glucose load. Only 1 abnormal value on the OGTT is needed on both criteria to diagnose GDM. Women with diabetes antedating pregnancy were excluded in this study. Based on the 75-g OGTT result, the patients were divided into 4 groups and were followed through delivery. Pregnancy outcomes of the 4 groups were then compared.

Results: Among the 389 patients studied, POGS-CPG group had a GDM prevalence rate of 29% whereas the IADPSG group had 16%. Trends have shown that in patients diagnosed with GDM under IADSGP and POGS criteria, no significant differences in the birthweight status (p=0.156), mode of delivery (p=1.000), indication of cesarean section (p=1.000), and other complications (p=1.000) were noted. The 75 g OGTT values of patients in both groups were not significant predictors of APGAR scores. However, the 1-hour post-glucose load value was shown to be a significant predictor of birthweight. Yet, the regression models of FBS parameters in predicting APGAR scores and birthweight were still weak.

Conclusion: There was no significant difference noted between the IADPSG group versus the POGS-CPG group in terms of maternal and neonatal outcome.

Keywords: Gestational Diabetes Mellitus, 75 grams OGTT, IADPSG criteria

INTRODUCTION

The human body is a microcosm of metabolic interactions orchestrated to perform one common function. The main energy source that fuels this machinery is glucose. Diabetes is a chronic disease that affects the way the body metabolizes its fuel, glucose. It is a pandemic that sweeps the globe, rising in parallel to the incidence of obesity. Roughly 4.6% or 390 million of the population in the Philippines is diabetic. These statistics do not even reflect the 5% of the population who remain undiagnosed and 9% who are prediabetics.[1] Truly, it is a metabolic timebomb waiting to explode.

Pregnancy has long been recognized as a diabetogenic state whereby insulin sensitivity increases with advancing gestation.[2] These changes take place to accommodate fetal nutritional requirements and to ensure a continuous supply of nutrients to the growing fetus. Derangement in the ability to meet these demands would eventually lead to the development of gestational diabetes mellitus (GDM) that is riddled with maternal, fetal and neonatal morbidities extending even after delivery. It is of paramount importance, therefore, that early detection and treatment be afforded to pregnant women to prevent these complications.

Admittedly, there is much confusion regarding the screening and diagnosis of GDM. The lack of international uniformity in the approach to its ascertainment and diagnosis presents a major obstetrical hurdle. Several guidelines have been developed; however, none of these accurately predict maternal or neonatal morbidity and are not

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suited to our own population. The realization of the need to adapt a guideline that best serves our ethnicity is upon us. Thus, the objective of this study is to evaluate the most recently used criteria of the International Association of Diabetes and Pregnancy Study Group (IADPSG) and the local guidelines endorsed by the Philippine Obstetrical and Gynecological Society (POGS) by characterizing the ability to predict which pregnancy will suffer adverse maternal or neonatal outcome.

Review of Related Literature

GDM is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy.[3] It is one of the most common medical complications of pregnancy associated with adverse maternal and perinatal outcomes that extend even beyond the postpartum period.

Approximately 7% of all pregnancies are complicated by GDM, resulting in more than 200,000 cases annually. The prevalence may range from 1-14% of all pregnancies; depending on the population observed and the diagnostic criteria used.[4] In the Philippines, 1.9% of pregnant women admitted in the last 5 years have GDM.[5] However, this data is not a true reflection of the nationwide prevalence and the cause of this apparent discrepancy may be due to underreporting of cases. GDM indeed poses an important public health problem.

GDM has been associated with adverse pregnancy outcomes such as cesarean delivery, macrosomia, birth trauma, preterm birth and preeclampsia.[6] Women with GDM will ultimately develop overt diabetes in the ensuing 20 years, also, there is mounting evidence for long-range complications in their offspring that includes obesity and diabetes.[7] Therefore, the need to recognize the disease cannot be overemphasized. A key factor in the prevention of complications is through screening of pregnant women to effect early detection and timed intervention.

Two methods of biochemical screening for GDM have been used for the past 40 years: 1. The two-step 50 gramoral glucose challenge test (OGCT) and 100 gram oral glucose tolerance test (OGTT) is recommended by the American Congress of Obstetricians and Gynecologists and the Fourth International Workshops on GDM; 2. The one-step 75 gram 2-hour OGTT is the diagnostic test recommended by the World Health Organization (WHO) and is most used internationally. However, the diagnostic threshold for GDM is a moot point.

The IADPSG has spearheaded the formidable task of finding an international consensus for GDM diagnosis and proposed a new criteria last 2010.[7] These include performing a 75-g OGTT between 24 and 28 weeks of gestation without a screening test and using lower thresholds: 92 mg/dL (5.1 mmol/L) for fasting plasma glucose, 180 mg/dL (10 mmol/L) 1-hour post-glucose load, and 153 mg/dL 2-hour post-glucose load (8.5 mmol/L). Only 1 abnormal value on the OGTT is needed to diagnose GDM. These recommendations are based on the results of the international multicenter study, Hyperglycemic Adverse Pregnancy Outcome (HAPO) study, which quantified the risk of adverse pregnancy outcomes associated with degrees of maternal glucose intolerance.[8] The new IADPSG cutoffs identify women with a relative risk of 1.75 for a newborn birth weight above the 90th percentile and approximately 1.5 for other major adverse maternal or neonatal outcomes such as primary cesarean delivery, prematurity, and preeclampsia.[8]

The POGS convened in 2011 to create a local threshold for GDM. Guided by the belief that all Filipino gravidas are considered "high risk" by virtue of race or ethnic group (Pacific Islander), POGS recommended use of threshold values adapted from IADPSG/American Diabetes Association (ADA) and World Health Organization (WHO): FBS ≥92 mg/dl (adapted from ADA and IADPSG consensus threshold) or a 2 hour ≥140 mg/dl (adapted from the WHO recommendation). These values were proposed to minimize underdiagnosis and to promote early intervention that could possibly curtail the adverse outcomes brought about by GDM.[9]

Few investigations have been allotted to the predictive ability of these new criteria for the 2-hour 75-g OGTT in terms of pregnancy outcomes. Thus, the objective of this study is to evaluate the new POGS-CPG and IADPSG criteria for GDM by characterizing their ability to predict which pregnancies will suffer macrosomic birth, preeclampsia, cesarean delivery, or perinatal death.

A retrospective study in 2010 done by Bodmer-Roy et al estimated the incidence of GDM according to IADPSG criteria and the pregnancy complications in women fulfilling these criteria. Women classified as nondiabetic by the Canadian Diabetes Association (CDA) criteria but considered GDM according to the IADPSG criteria have similar pregnancy outcomes as women without GDM.[8]

Using the 2-hour 75 grams OGTT, Schmidt et al authored the Brazilian Gestational Diabetes Study in 2001 and predicted the outcome of patients diagnosed with GDM using the ADA and the WHO criteria. GDM by both ADA and WHO criteria predicted increased risk for macrosomia, pre-eclampsia, and perinatal death.[10]

Because implementation of the POGS-CPG criteria would imply an increase in the number of women diagnosed with GDM, it will further burden the health care system. The strain of strict blood glucose monitoring and diet modification may also cause unnecessary stress and incur considerable expenses for most women, which could negatively affect the fetus. Indeed, maternal stress and

excessive strict blood glucose monitoring have resulted in an increased percentage of small-for-gestational-age (SGA) neonates. However, these drawbacks are acceptable and justified if maternal and neonatal health will improve.

Acceptance of the POGS-CPG criteria for GDM must prompt medical check and balance from every obstetrician. The long-term medical risks associated with women labeled GDM such as maternal stress, rates of SGA neonates, breastfeeding failure from early infant separation, and unnecessary cesarean section must be avoided.

GENERAL OBJECTIVE

The primary endpoint of this study was to systematically evaluate the obstetrical and neonatal outcomes of all womenenrolled in our prenatal clinic using the 75 grams oral glucose tolerance test (OGTT) diagnostic tool at 24-28 weeks age of gestation and by following the IADPSG/ADA criteria versus the POG-CPG cut-off criteria.

Specific Objectives:

1. Determine the percentage of women with and without GDM using the POGS-CPG criteria
2. Determine the demographic characteristics of patients as to age, parity and weight.
3. Determine the number of women with GDM related complications (preeclampsia, cesarean section, preterm birth) in both groups.
4. Compare the neonatal outcome in terms of Apgar score and birth weight in the POGS-CPG group against the IADPSG group.

Operational Definition of Terms:

1. Macrosomia is a term used for a fetus or infant with a birth weight exceeding 90th percentile. Among Filipinos, a birthweight of >3800g are considered macrosomic. They are described as anthropometrically different from large-for-gestational age (LGA) infants by having excessive fat deposition on the shoulder and trunk, which predisposes them to shoulder dystocia or cesarean delivery.
2. Small for Gestational Age (SGA) refers to an infant that is smaller than expected for age and gender or with a birth weight below the 10th percentile.
3. Appropriate for Gestational Age (AGA) refers to an infant that is expected for age and gender or with birth weight between the 10th and 90th percentile.
4. Large for Gestational Age (LGA) refers to an infant that is larger than expected for age and gender or with a birth weight above the 90th percentile.
5. APGAR score is a scoring system clinically used to identify those neonates who require resuscitation as well as to assess the effectiveness of any resuscitive measures.
6. Preeclampsia is a pregnancy specific syndrome associated with blood pressure elevation of ≥140/90mm Hg after 20 weeks of gestation with the presence of proteinuria of >300 mg/24 hours or ≥ plus 1 on dipstick.
7. Preterm Birth is birth before 259 days or 37 weeks from the first day of the last menstrual period or 245 days after conception.
8. Primary cesarean delivery is a cesarean delivery done on a laboring woman for the first time.
9. Gestational Diabetes Mellitus (GDM) is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy. This definition applies whether or not insulin is used for treatment.
10. International Association of Diabetes and Pregnancy Study Group (IADPSG) is an umbrella association formed through the efforts of various study groups around the world to facilitate the HAPO study. They spearheaded the task of finding an international consensus for GDM diagnosis.

METHODS

Research Design

This is a randomized controlled prospective study.

Research Locale:

The study was conducted at the institution's outpatient prenatal clinic from September 1, 2012 to February 28, 2013.

Research Subjects:

The study enlisted patients enrolled at the institution's prenatal clinic based on the inclusion and exclusion criteria. The patients underwent a detailed briefing about the nature of the study followed by provision of signed consent.

Inclusion Criteria: this study included:

1. Pregnant women aged 20 years and above.
2. Adequate prenatal follow-up at the outpatient department starting before or at least not after the 22nd week of gestation.
3. Admitted and delivered at our institution.
4. Diagnosed to have GDM utilizing the POGS-CPG

or IADPSG/ADA consensus.

5. Signed informed consent

Exclusion Criteria: this study excluded:

1. Pregnant women whose date of last menstrual period was not certain and whose ultrasound was not taken from 6-20 gestational weeks.
2. Women who were unable to complete the 75-g OGTT within 32 weeks gestation.
3. Women who had 75 g OGTT taken in another laboratory.
4. Diagnosed diabetes antedating pregnancy that required medical treatment.
5. Women with multiple gestations.
6. Pregnant women with medical and/or surgical conditions that affected glucose metabolism such as hepatitis B or C, acromegaly, hyperthyroidism, and post-pancreatectomy patients.
7. Women who had long term intake of medications that affect glucose metabolism such as steroids and β-adrenergic agonists, anti-psychotic drugs.

Scope and Limitations:

The study enlisted patients enrolled at the institution's outpatient prenatal clinic from September 2012 to February 2013 who fulfilled the study inclusion criteria. The study subjects were invited to do a 2-hour 75 grams OGTT between their 24th to 28th weeks of gestation. They were then followed through delivery and during the in-hospital postpartum period. Pregnant women with overt diabetes antedating or during pregnancy needing insulin therapy were excluded from the study. Women with medical conditions such as hepatitis B or C, hyperthyroidism or those who underwent pancreatectomy were likewise excluded. Multiple gestations and fetuses with congenital anomaly were also not included.

The variations in the timing of 75 g OGTT administration can potentially have an impact on fetal morbidity making this a limiting factor of the study. Additionally, this study applied treatment of hyperglycemia through a hypocaloric diet that may have affected GDM-related outcomes.

Data Collection Procedure

Institutional ethics committee approved the study protocol and patients consented to participate after being informed about the nature of the study. Women 20 years and above having their first prenatal check up at the institution's outpatient prenatal clinic who satisfied the inclusion criteria and had no history of diabetes were invited to participate in the study. During the first prenatal visit, demographic data and information concerning family history of hypertension and diabetes were collected. Standard anthropometric measurements for each subject were taken and recorded in their charts. Fasting blood sugar (FBS) or glycosylated hemoglobin (HbA1c) was taken during the first visit to detect undiagnosed diabetes. During the second prenatal visit, laboratory results were reviewed and the exclusion of patients with overt diabetes mellitus were determined. The patients were then randomly assigned to either POGS-CPG group or IADPSG group. Simple randomization technique was employed and the assigned diagnostic criteria group was written on the orange card for ease of interpretation. Standard prenatal care was instituted according to the practice of our outpatient department. All data gathered from each visit such as weight gain, fundic height measurement, and laboratory results were recorded in the patients index card and duplicated in the out patient department records. Between their 24th and 28th gestational week, they were invited to do a 2-hour 75-g OGTT and were then followed through delivery and during the in-hospital postpartum period.

The glucose tolerance test used standard laboratory procedures. A 75-g anhydrous glucose load in a 240 ml containing commercial preparation (Medic Orange) was administered after an 8-12 hour fast between the 24th and 28th week of gestation. The patients were particularly instructed to follow an unrestricted diet and to do physical activity 3 days prior to testing. On arrival at the laboratory, they were all required to take a ten-minute rest and were not allowed to smoke during the entire procedure. Fasting, 1 hour, and 2 hour samples were obtained from an antecubital vein. Serum samples were collected in plain red tubes, which then underwent centrifugation. Plasma measurements were performed using the wet chemistry method. The coefficient of variation was at<5%. Serum glucose was assayed using the Seimens Dimension. Urine specimen was tested using the Multistix strips to detect for the presence or absence of glucose.

GDM was defined according to POGS-CPG new recommendations for the 2-h 75-g OGTT as having at least one value greater than a fasting glucose of ≥92 mg/dl (5.1 mmol/l), a 1-hour glucose of ≥180 mg/dl (10 mmol/l), or a 2-hour glucose of ≥140 mg/dl (8.6 mmol/l). The less stringent IADPSG criteria had the same FBS and 1-hour threshold and differed from the POGS-CPG criteria on the 2nd hour with cut-off set at 153 mg/dl (8.5 mmol/L). Based on the results, there were now 4 groups of subjects, those with or without GDM according to the POGS-CPG threshold and participants with or without GDM based on the IADPSG criteria.

The timing of delivery was determined by standard practice. After delivery, routine neonatal and postpartum cares were carried out.

All data collected were tabulated and entered into Microsoft Excel 2010. From this spreadsheet, statistical analysis was established using Systat software version 12. Continuous variables were expressed in mean and standard deviation while categorical variables were described in frequency and percentage distribution. The one way analysis of variance (ANOVA) was used to test for continuous variable differences and was employed due to non-parametric distribution. Chi Square test of independence was used to test for differences in proportions and associations. A p-value of less than 0.05 was considered significant.

RESULTS

Three hundred and eighty-nine patients were included in the study. One hundred eighty-eight pregnant women were evaluated using the IADPSG criteria while 201 women were evaluated using the POGS-CPG criteria. Among the 188 patients under the IADPSG group, 157 were considered normal and 31 abnormal. One hundred forty two were considered normal according to the POGS-CPG criteria while 59 were considered to have GDM. Maternal and neonatal outcomes were then compared between groups. (Figure 1)

The prevalence of GDM among patients evaluated by the IADPSG criteria was 16% while POGS-CPG group had a prevalence rate of 29% (Figure 2). Among patients with GDM, 52% in the IADPSG group were primigravid while 47% were noted at the POGS-CPG group. The same trend was noted for patients without GDM in both groups. However, parity was not found to be factor associated with GDM. No significant difference was also noted in the patient's age across all groups with a p value of 0.096 (Table 1).

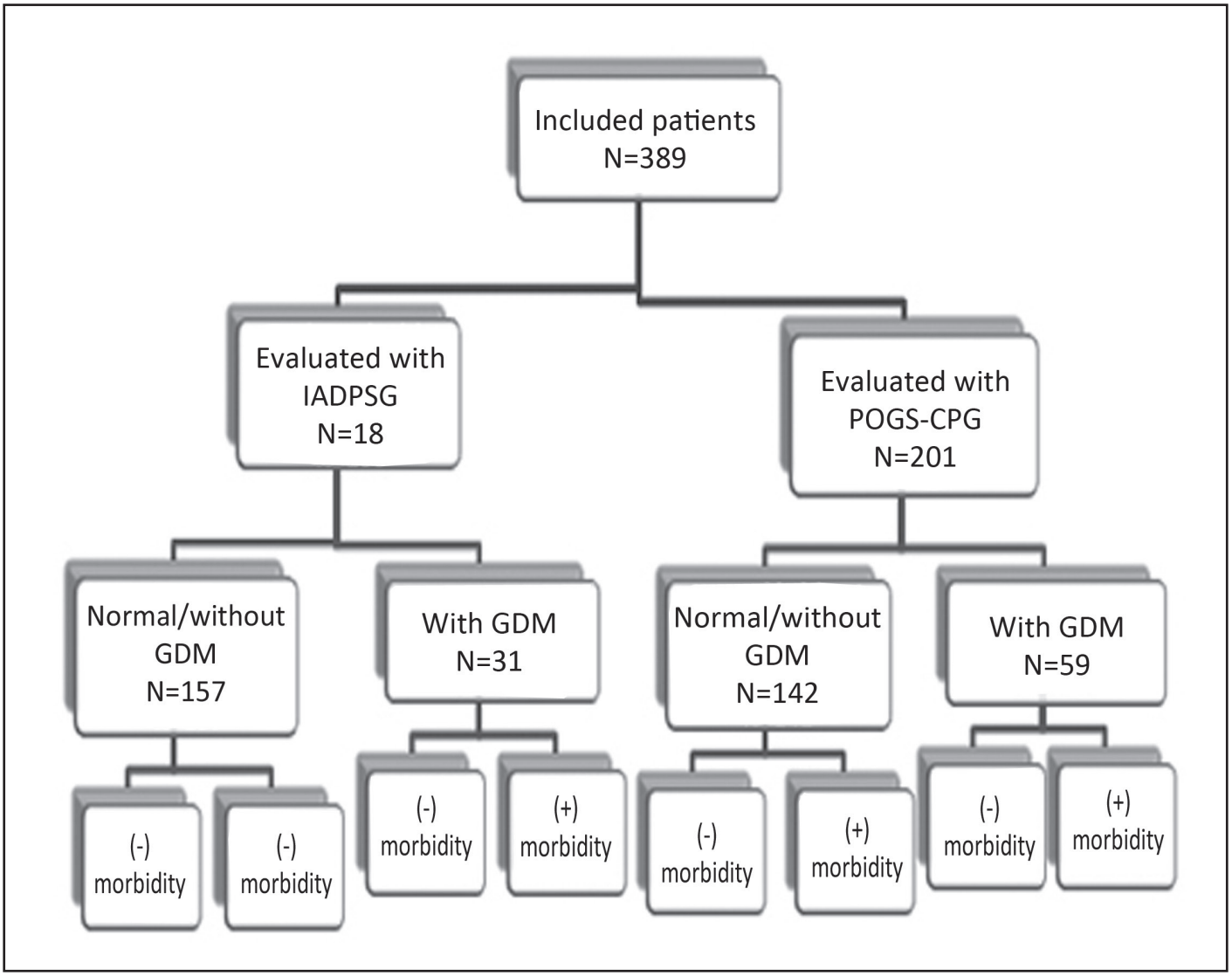

Figure 1

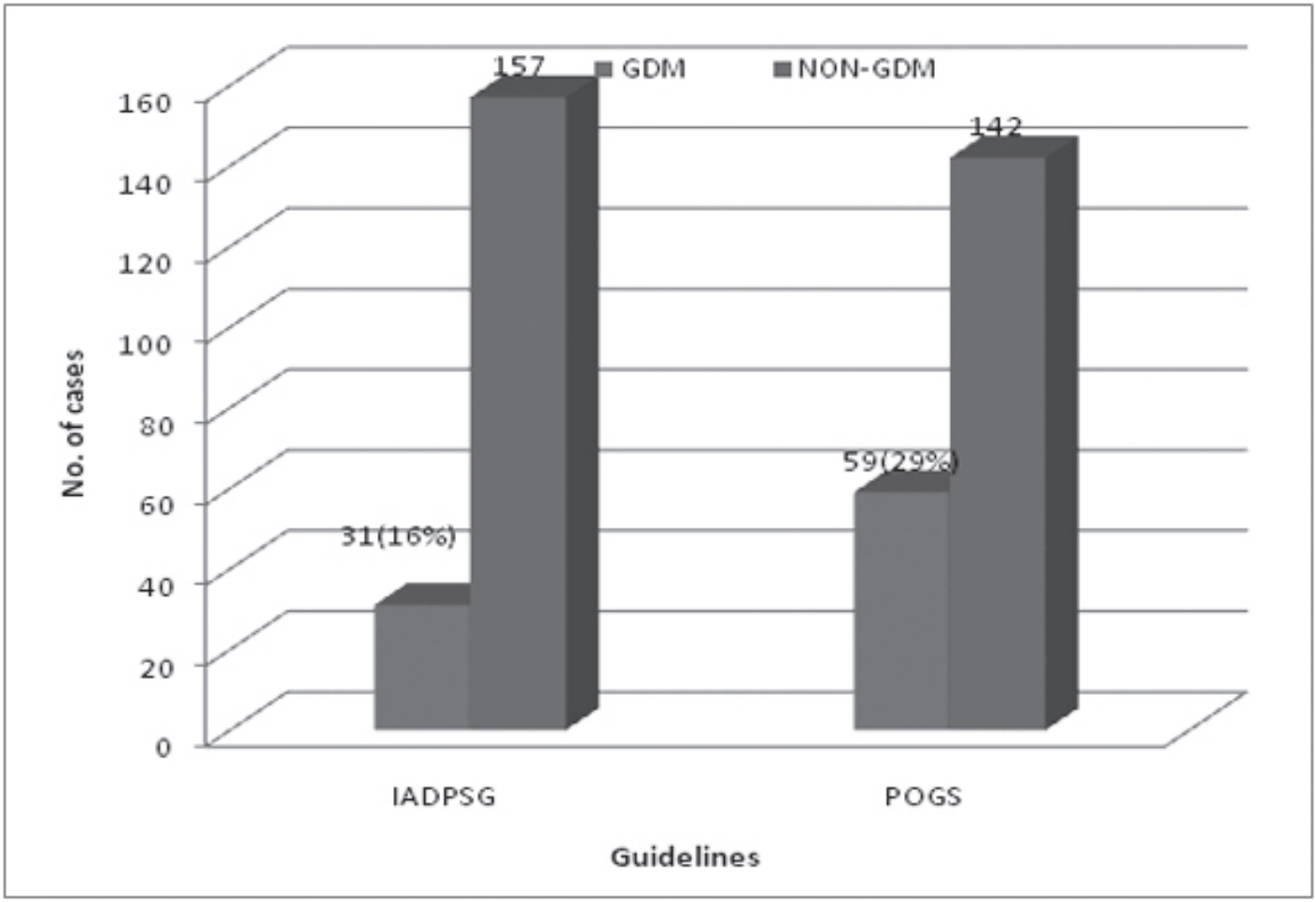

Figure 2. Prevalence of GDM among IADPSG and POGS-CPG criteria

Table 1. Maternal profiles

	IADPSG				POGS				
Maternal profiles	**GDM (+) (n=31)**		**GDM(-) (n=157)**		**GDM (+) (n=31)**		**GDM(-) (n=157)**		**P- value**
Age (years) mean±sd	27.90	4.24	28.9	5.04	30.47	4.81	29.14	5.09	0.096
Parity									
1	16	52%	90	57%	28	47%	70	50%	
2	11	35%	35	22%	10	17%	39	28%	
3	2	6%	21	13%	13	22%	25	18%	
4	0	0%	8	5%	4	7%	6	4%	
5	1	3%	3	2%	3	5%	1	1%	
6	1	3%	0	0%	1	2%	1	1%	0.187

Table 3 presents the 75-g OGTT values and the age of gestation they were performed in patients with GDM with a mean of 27 weeks AOG. Only the fasting plasma glucose of patients with GDM in the IADPSG (89.17±11.17) and POGS-CPG (84.73±9.48) groups differed significantly (p=0.048) wherein the IADPSG group had a higher FBS values. In patients without GDM, no significant differences were noted in the 75 g OGTT values (FBS, 1st hour and 2nd hour) on both groups (Table 4).

Table 3. 75 g OGTT Results of GDM Patients

FBS profiles		IADPSG		POGS-CPG		p-value
AOG taken	mean±sd	27.01	2.01	27.31	3.51	1.000
FBS	mean±sd	89.17	11.17	84.73	9.48	0.048
1st hour	mean±sd	159.97	29.13	167.15	26.60	1.000
2nd hour	mean±sd	145.84	29.74	150.20	20.53	1.000

Table 4. 75 g OGTT Result of Patients Without GDM

FBS profiles		IADPSG		POGS-CPG		p-value
AOG taken	mean±sd	26.04	2.41	27.53	3.32	0.000
FBS	mean±sd	80.00	6.72	78.57	6.37	0.606
1st hour	mean±sd	126.55	21.87	124.45	22.41	1.000
2nd hour	mean±sd	112.45	19.36	109.21	16.99	0.939

The normal APGAR score was reported to range between 8 to 10. Among patients with GDM, a significant difference was demonstrated in the APGAR score at 1 minute (p=0.025) and at 5 minutes (p=0.055) across groups. Women with GDM evaluated with the IADPSG criteria had a better APGAR score compared to those evaluated by the POGS-CPG criteria. (Table 5). However, this trend was not noted in normal patients for both groups (Table 6).

A cross-sectional analysis of neonatal weight in patients evaluated by the IADPSG criteria showed 3% had large for gestational age infants in patients with and without GDM (Table 7). In the POGS-CPG group, 5% of patients with GDM had LGA neonates. Patients assessed by the POGS-CPG guidelines indicated significant differences in birthweight status (p=0.012) as compared with patients under IADSGP guidelines (p=0.542). However, other clinical outcomes of GDM did not show significant associations in their mode of delivery, rate of cesarean section, and other complications. In this case, patients with GDM under IADPSG and POGS-CPG groups did not show significant differences in the birthweight status (p=0.156), mode of delivery (p=1.000), rates of cesarean section (p=1.000), and other GDM-related complications (p=1.000).

Table 5. Neonatal APGAR Scores Between Groups (With GDM)

APGAR Score		IADPSG		POGS-CPG		p-value
1 min	mean±sd	8.71	0.46	8.86	0.39	0.025
5 mins	mean±sd	10.00	0.00	9.95	0.22	0.055
10 mins	mean±sd	0.00	0.00	0.00	0.00	1.000

Table 6. Neonatal APGAR Scores Between Groups (Without GDM)

APGAR Score		IADPSG		POGS-CPG		p-value
1 min	mean±sd	8.68	0.78	8.87	0.49	1.000
5 mins	mean±sd	9.85	0.53	9.95	0.30	1.000
10 mins	mean±sd	9.33	0.82	0.00	0.00	0.000

Regression analysis of 75-g OGTT values showed that FBS values did not yield significant predictors that would influence APGAR scores. The age of gestation was noted to weakly predict the APGAR at 5 minutes whereas the 1st hour post-glucose load result was shown to be a predictor of birthweight. However, the regression models of 75-g OGTT parameters in predicting APGAR scores and birthweight were still weak. It is recommended that a larger study be done to strengthen this association.

DISCUSSION

For the past 50 years, the diagnostic criteria for GDM have undergone considerable evolution. Despite these advances, the identification of the best cut-off points in predicting GDM-related outcomes remain unclear. Adding to the confusion, an ongoing debate exists as to which diagnostic criteria should be uniformly used. To answer these questions, the HAPO trial was done. Results showed that with increasing glycemia, the rates of macrosomia, cesarean section, pre-eclampsia and preterm birth also increased. The IADPSG criteria was made based on these outcomes.[8]

In this study, the prevalence rate of patients with GDM evaluated by the POGS-CPG criteria was 29% while those evaluated by the IADPSG was at 16%. The IADPSG group prevalence rate was similar to the reported local prevalence of 14.2% by the ASEAN Study Group on Diabetes in Pregnancy (ASGODIP) study which utilized the WHO criteria to diagnose GDM.[9] The POGS-CPG criteria, as observed in this study, would nearly double the women classified as GDM in our study subjects. However, these women did not have worse pregnancy outcomes than those without GDM according to both criteria. An increased rate of GDM is valid since the new POGS-CPG thresholds are lower compared to the criteria of IADPSG. In this study, almost one-fourth of pregnant women were diagnosed with GDM using the new guidelines of POGS-CPG. This increase in the diagnosis of GDM however, might negatively affect the healthcare system by exhausting human resources and by subjecting the patient to unnecessary stress and expenses.

Some studies show that an increased risk of GDM is

Table 5. Neonatal APGAR Scores Between Groups (With GDM)

	IADPSG					POGS					
Outcomes	**GDM (+) (n=31)**		**GDM(-) (n=157)**		**p-value**	**GDM (+) (n=59)**		**GDM(-) (n=142)**		**p-value**	**overall**
Gestational age											
AGA	30	97%	146	93%		56	95%	138	98%		
LGA	1	3%	5	3%		3	5%	0	0%		
SGA	0	0%	6	4%	0.542	0	0%	4	3%	0.012	0.156
Gestational age											
mean±sd	3084.03	397.31	2913.37	429.56	0.135	3142.97	342.29	2999.03	326.21	0.088	0.001
Mode of delivery											
NSD	15	48%	110	70%		44	75%	113	80%		
CS	9	29%	35	22%	0.167	6	10%	24	17%	0.363	1.000
RCS	5	16%	12	8%		6	10%	1	1%		
Others:											
OFE	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LFE	1.000	p-value	p-value	p-value	p-value	p-value	p-value	p-value	p-value	p-value	p-value
VBAC	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
CS Indication											
None	20	65%	124	79%		53	90%	121	86%	1.000	1.000
Breech	1	3%	1	1%		1	2%	2	1%		
Breech in Labor	0	0%	3	2%		0	0%	0	0%		
CPD	4	13%	14	9%		5	8%	10	7%		
FOI	1	3%	0	0%		0	0%	0	0%		
NRFHRP	5	16%	13	8%		0	0%	9	6%		
Transverse Lie	0	0%	2	1%	1.000	0	0%	0	0%		
Complication											
(+)	28	90%	144	92%		56	95%	137	97%	1.000	1.000
(-)	3	10%	13	8%	0.799	3	5%	5	4%		
specific:											
Gestational hypertension	1	3%	1	1%		2	3%	3	2%	0.606	1.000
Mild Preeclampsia	1	3%	3	2%		0	0%	0	0%		
Postpartum hemorrhage	0	0%	0	0%		0	0%	1	1%		
Preeclampsia	0	0%	2	1%		0	0%	1	1%		
Preterm Birth	0	0%	7	4%		1	2%	0	0%		
Preterm Labor	1	3%	0	0%	1.000	0	0%	0	0%		

noted in women with advancing age or with increasing parity. As observed in this study, maternal age and increasing parity was not associated with the development of GDM. The total weight gain of patients was similar between groups and no trend of increasing maternal weight gain was linked with GDM. However, care must be taken in the interpretation of these results. Increase surveillance is still advised in women exhibiting these characteristics.

Several studies support the notion that women with GDM were more likely to have cesarean section as opposed to vaginal deliveries. In this study, patients with GDM in the IADPSG group had higher rate of cesarean section compared to the POGS-CPG group. The same was also true in patients without GDM. Cephalo-pelvic disproportion was the most frequent indication for these primary cesarean sections. On the other hand, patients with GDM in the POGS-CPG group had 75% vaginal delivery rate and only 10% primary cesarean section rate. The comparison on both groups was not significant statistically. The reason behind the result may be attributed to the earlier initiation of medical nutrition therapy in patients with GDM in the POGS-CPG owing to its lower threshold for diagnosis.

However, despite the early commencement of diet therapy in patients with GDM in the POGS-CPG group, more LGA neonates were noted. Five percent of LGA neonates were noted in the POGS-CPG group while only 3% on the IADPSG group. This finding was statistically significant (p=0.012).

In the analysis of neonatal outcome, the APGAR scores of patients with GDM between groups showed significant differences at both 1 minute (p=0.025) and 5 minutes (p=0.055). POGS-CPG group showed better APGAR scoresat 1 minute while the IADPSG group showed higher

Table 8. Regression Analysis 75 g OGTT Values: Predictors of APGAR scores and Birth weight

	Coefficients (a)								
	Unstandardized Coefficients		Standardized Coefficients						
Parameters	**B**	**Std. Error**	**Beta**	**t**	**p-value**	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
APGAR at 1 min (constant)	8.5690	0.414		20.677	0.000				
AOG 75g	0.0120	0.011	0.059	1.117	0.265	0.101	0.01	-0.001	0.60365
GTT FBS	-0.0040	0.004	-0.054	-0.982	0.327				
GTT 1st hr	0.0010	0.002	0.052	0.638	0.524				
GTT 2ndhr	0.0010	0.002	0.026	0.329	0.743				
APGAR at 5 mins (constant)	9.4200	0.246		38.289	0.000				
AOG 75g	0.0140	0.006	0.116	2.216	0.027	0.135	0.018	0.008	0.35838
GTT FBS	0.0000	0.002	0.011	0.196	0.845				
GTT 1st hr	0.0000	0.001	0.036	0.442	0.659				
GTT 2ndhr	0.0000	0.001	0.02	0.255	0.799				
Birth weight (constant)	2498.1	254.582		9.813	0.000				
AOG 75g	-5.945	6.454	-0.047	-0.921	0.358	0.226	0.051	0.041	370.84359
GTT FBS	4.565	2.484	0.099	1.838	0.067				
GTT 1st hr	2.526	1.045	0.193	2.418	0.016				
GTT 2ndhr	-0.347	1.164	-0.024	-0.298	0.766				

APGAR score at 5 minutes. This finding, however, is not significant clinically. In normal subjects, the IADPSG group consistently showed lower APGAR scores at 1 minute compared to POGS-CPG group; however, this finding did not reach statistical difference. This study has surmised that POGS-CPG guideline is a better predictor for APGAR scores in pregnant women with or without GDM.

The HAPO Study found increases in each of the three values on the 75 g OGTT that are associated with graded increases in the likelihood of pregnancy outcomes such as LGA, cesarean section, fetal insulin levels and neonatal fat content.[10] The regression analysis done on this study did not yield significant association between increasing values on 75 g OGTT and these complications. What is significant though, is the 1-hour post-glucose load that was found to be anintrinsic predictor of birthweight. However, this association was weak. In this study, no macrosomic births, shoulder dystocias or perinatal deaths were noted. However, this might not be directly attributed to the diagnostic criteria used but may be due to the hypocaloric diet routinely advised to GDM patients.

We have observed that by using either the POGS-CPG criteria or IADPSG threshold, the maternal outcomes on both groups are not significantly different. These two criteria are valid options that can be used for prevention of GDM-related complications. However, the noted differences in the birthweight and APGAR score favoring the POGS-CPG group deserve mention. The POGS-CPG criteria, by identifying a large number of cases, may have greater potential for prevention. However, this must be weighed thoroughly since its acceptance would mean added cost to the patient. It is now up to the obstetrician which guideline would best serve the patient.

CONCLUSION

A larger percentage of women were diagnosed with GDM using the POGS-CPG criteria owing to the lower threshold used as compared to the IADPSG guidelines. However, these women did not have worse neonatal or maternal outcomes compared to those without GDM in both groups.

In this study, the POGS-CPG criteria were a better predictor of APGAR score albeit this association was weak. The POGS-CPG criteria, by identifying a large number of cases, may have greater potential for prevention. However, this must be weighed thoroughly since its adoption would mean added cost to the patient. It is now up to the obstetrician which threshold will best serve the patient. Adaptations of both guidelines are thus accepted and no differences in predicting outcomes were noted.

RECOMMENDATIONS

The author recommends continuing this study and suggests a multicenter collaboration to increase the number of subjects that would greatly enhance the power of the study and reduce the margin of error. A predictive

model can be further pursued in future studies so as not to rely solely on diagnostic cut-off values.

There is an urgent need to educate pregnant women regarding GDM, therefore, awareness programs should be advocated and be made available especially in the rural areas. Albeit the pregnancy outcomes of GDM are not a serious threat to the safety and health of mothers and infants, undiagnosed DM can be fatal. Therefore, further studies are recommended to determine whether universal screening programs for the diagnosis of GDM are warranted. Studies concerning the optimal management and role of follow up programs for affected mothers and babies are encouraged. Possible interventions to reduce the rates of the development of permanent diabetes in the mother should also be pursued.

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