Prevalence of gestational diabetes mellitus among women attending antenatal care at public health centers in Rwanda

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Abstract

Aim: This study aimed to determine the prevalence of gestational diabetes mellitus (GDM) among women attending public health centers in Rwanda using the World Health Organization (WHO) 2013 diagnostic criteria.

Methods: A cross-sectional analysis was performed on 281 pregnant women attending antenatal care at urban and rural public health centers. Diagnostic testing was performed between 24 and 32 weeks gestation using a 75 g oral glucose tolerance test. Venous plasma glucose was centrifuged within one hour and measured at one of two laboratories. Descriptive statistics were used.

Results: GDM prevalence was 3.2%, (4.28% urban and 2.13% rural). Women diagnosed with GDM were older, had higher BMI, hypertension, and glycosuria of ≥2+. None with HIV (14/281) had GDM. All women reported birth outcomes. All women with GDM (9/281) had normal glucose values postpartum and therefore it is unlikely that any women had overt diabetes.

Conclusion: This study adds important information about the GDM prevalence in Rwanda, which is a resource-limited country. Although the prevalence of 3.2% was low, significant risk factors for GDM were identified. We anticipate that the risk factors for developing GDM will increase in the near future, similar to the global trend of obesity and diabetes, necessitating continued research and education in this important condition that carries a double burden of disease to both mothers and infants.

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1. Introduction

The prevalence of diabetes worldwide doubled from 1980 to 2014 [1], and the rate in the general population parallels the rate in pregnancy [2]. Gestational diabetes mellitus (GDM) is a condition of carbohydrate intolerance first diagnosed in the second or third trimester of pregnancy, which is not pre-existing type 1 or type 2 diabetes (T2DM) [3,4]. In 2017, hyperglycemia in pregnancy was estimated to affect one in seven births globally [5]. Both GDM and T2DM confer risk to pregnant women and their offspring with both short and long-term complications related to hyperglycemia and hyperinsulinemia [6].

A systematic review of six countries in Africa estimated the overall prevalence of GDM to be 5% [7]; however, there is variability due to the availability of screening procedures and diagnostic criteria [7,8]. Two recent studies indicated a 2.9% prevalence rate in Kenya [9], and a 9.1% rate in South Africa [10]. Both studies used the WHO (2013) criteria based on the International Association of the Diabetes and Pregnancy Study Groups (IADPSG) evidenced-based practice recommendations [3,6,11].

A clear relationship exists between GDM and the risk of adverse maternal, fetal, and neonatal outcomes, as demonstrated by the international Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) study [6]. The adverse maternal outcomes of GDM are well documented [6,12], and about half of the women diagnosed develop T2DM within five to ten years [5]. For the affected fetus, in addition to the genetic predisposition and immediate consequences, intrauterine exposure to hyperglycemia and the resultant hyperinsulinemia increases the risk of childhood obesity and T2DM later in life [13,14]. All pregnant women should be tested for GDM at 24–28 weeks gestation, if not previously diagnosed [4].

With increasing prevalence associated with the global epidemic of obesity and diabetes, more women in the prime of their life will be at risk for GDM and the attendant burden to their offspring [15]. This factor will likely affect not only women and children, but also families, communities and the country's healthcare system. Women aware of their GDM positive status could be directed to attend prevention programs and reduce the risk of developing T2DM and the effect on their offspring [3–5]. Rwanda supports the International Diabetes Federation's (IDF) Global monitoring framework (GMF) that tracks the progress of prevention and diabetes care programs [16]. The purpose of this study was to assess the prevalence of GDM in urban and rural health centers in Rwanda using the gold standard 75 g OGTT venous testing. Currently, pregnant women are not systematically screened for GDM in Rwanda. The Ministry of Health (MOH) 2012 Gynecology and Obstetric clinical protocol suggested that investigations for diabetes in pregnancy include a fasting blood sugar (capillary) and 50 g OGTT at 24–28 weeks gestation. No resources have been allocated to test systematically, however. Some clinicians, not all, will test for overt diabetes when confronted with obvious signs or symptoms or multiple risk factors.

2. Materials and methods

2.1. Participants

A cross-sectional design was used to guide data collection and analysis. Pregnant women were recruited from the general population attending antenatal clinics at specified public health centers in Rwanda between 10 April and 16 September 2017. Four health centers were located in or near the capital city of Kigali, under Muhima District Hospital catchment area and six were located in the rural catchment area of Rwamagana District Hospital, in the Eastern Province of Rwanda.

All women attending the study sites, 15 years or older with singleton pregnancies, between 24 and 28 weeks gestation, with a maximal range to 32 weeks [6] were eligible for inclusion. Gestational age and expected date of birth were based on Naegele's rule and palpation of fundal height. If the last menstrual period date was unknown or there was a discrepancy between these two criteria, then an obstetric ultrasound was ordered, and the gestational age was based on the ultrasound result. Pregnant women with the human immunodeficiency virus (HIV) and on antiretroviral medications (ARVs) were included. Excluded were women with pre-existing diabetes mellitus, multiple gestations, or incomplete plasma glucose values. A ticket of 2000 Rwandan francs (about $2.50) was given to urban participants and 3000 Rwandan francs (about $3.50) for those in rural areas to cover transportation costs.

After the initial contact at the study site, women were followed up via phone by the research coordinator, a Clinical Officer, to alert them of the date and time of their OGTT. For the many women without phones, particularly in the rural area, the research coordinator communicated with them via their local Community Health Worker (CHW). In Rwanda, each small village has at least one CHW with a phone. The research coordinator called the CHW and requested a convenient time to gather the pregnant women in a small group to share information and address their questions about their upcoming OGTT.

We conducted a pilot study on 40 women using the urban health center laboratory in February and March 2017. The glucose results revealed very low values, and we discovered that the serum samples had not been immediately centrifuged and quickly decreased due to glycolysis. The adjoining hospital laboratory also was not suitable due to logistical issues and staff shortage. We, therefore, moved the study site to the Rwanda Diabetes Association (RDA) in Kigali where we obtained timely and accurate results using RDA's laboratory.

An additional 281 pregnant women were recruited at the ten health centers, (140 from the urban area and 141 from the rural area), allowing for a 10% attrition rate. The sample size to detect prevalence of GDM was calculated to be 261 (95% CI, 5.2%; 0.052 ± 0.0261), based on the recommended IDF [17] regional interval rates of 5.62–12.83% (urban) and 0.7–5.9% (rural), and a systematic review estimation of 5% in Africa [7].

Additional women were included to cover for attrition and therefore the final sample size was 281.

2.2. Data collection

Information about the study was presented to the pregnant women and accompanying husbands attending the antenatal clinics, in addition to, flyers posted on the walls of the main rooms at the centers. Eligible women who agreed to participate returned early in the morning after an overnight fast at a convenient date, typically within a few days after initial contact.

The study began in the urban area, followed by recruitment in the rural area. In the urban area, women were given the option to be picked up at the health centers by taxi or come directly to the Rwanda Diabetes Association; however, most were picked up and driven the short distance to the association's headquarters. Most women in the rural areas came directly to the hospital, though some were picked up at prearranged locations on the main road to the hospital.

After an overnight fast and arrival at the data collection site, all women were given further information and signed consent, before gathering demographic, anthropometric and metabolic data. Data on socio-demographics; obstetric, medical and family history; medications, including ARVs; height, weight, blood pressure, fetal heart tone, and fundal height measurements were obtained using a standard questionnaire. A 10-point urinalysis was done, with particular attention to glucose, protein, ketones, nitrites, leukocytes, and blood.

Serum glucose was drawn from the antecubital vein using a 21-gauge needle and vacutainer tubes. A 75-gram anhydrous oral glucose load was given, and serum glucose levels were collected after 1 h and 2 h post-load. The glucose was Excel brand, produced in Kenya, measured to 82.5 g for allowance of water in the granules, using the pharmacy scale, and dissolved in 250 ml of cooled boiled water, as advised by Dr Pastakia [9]. The venous blood samples were centrifuged on site within one hour of the blood draw and analyzed by the Humalyzer 3000 (Human Diagnostics Worldwide: Germany) at RDA; and the Cobas C311 (Roach: Switzerland) at Rwamagana District Hospital. Women who tested positive for diabetes were given a nutritional handout and referred to the obstetrician for an ultrasound and follow-up care. All women were given breakfast immediately after the third and final blood draw before the journey home.

2.3. Study outcomes

The primary outcome was the prevalence of gestational diabetes, based on the gold standard 75 g OGTT venous testing. A GDM diagnosis was given using the IADPSG/WHO 2013 criteria of a single threshold value: fasting plasma glucose (FPG) 5.1–6.9 mmol/l (92–125 mg/dl); or a 1-hour of 10.0 mmol/l (180 mg/dl) or a 2-h 8.5–11.0 mmol/l (153–199 mg/dl), post a 75 g oral glucose load [3].

The secondary outcomes were based on the women's self-report, or observer report by the five trained and experienced clinician data collectors. A sixth team member (an OB/GYN) performed the dating ultrasounds to confirm gestational age if needed. Demographic data, client obstetrical, medical and family history were collected using a standard obstetric questionnaire. Anthropometric measurements and urinalysis were measured at the OGTT

visit using standardized procedures and health center equipment. Birth outcomes included preterm/term; female/male; birth weight; delivery method; and NICU admission or not.

2.4. Statistical analyses

The prevalence of GDM was estimated by the proportion of women who were documented as having developed the condition during their pregnancy, and an exact 95% confidence interval was constructed around the prevalence estimate. Including n = 281 mothers in this study allowed us to make a relatively precise estimate of GDM prevalence, meaning that the 95% confidence interval would extend only about 3 or 4 percentage points from the estimate. Characteristics of study participants and birth outcomes were compared between women who did and did not develop GDM using Fisher's exact tests (for categorical variables), 2-sample t-tests (for normally distributed continuous variables), and Wilcoxon rank sum tests (for non-normally distributed continuous variables). Glucose values were compared across BMI categories using Kruskal-Wallis analysis of variance tests or Fisher's exact test, as appropriate. All hypothesis testing was 2-sided, and p-values < 0.05 were considered statistically significant. Analyses were conducted using SPSS version 25 (Armonk, NY: IBM Corp.) and SAS v9.4 (Cary, NC).

2.5. Ethical approval

The Institutional Review Boards of the University of Rwanda and the two district hospitals overseeing the ten antenatal care sites approved the study. Permission was also obtained from the RDA in Kigali for the urban population. All participants received detailed information about the study and provided written informed consent before data collection.

3. Results

A flowchart showing the schema of the study was presented (Fig. 1). Pregnant women were recruited from the general public attending the ten health centers in Rwanda between April 10 and September 16, 2017. The characteristics of the 281 women who completed the FPG, 1-h and 2-h 75 g OGTT were presented (Table 1). Based on the WHO 2013 criteria [3], GDM was diagnosed in 9 (3.2%, 95% CI 1.5–6.0) women. Their follow-up glucose values after six weeks postpartum had returned to normal; eight had values of <5.5 mmol/l and one woman with 5.9 mmol/l, considered "prediabetes." Therefore, it is unlikely that any of the women in the study had overt diabetes. All 281 women provided a self-report of birth outcomes, except for one mother who had a fetal demise and not given all information.

All women attending the 10 public antenatal clinics during the study period had the opportunity to be in the study if they met the inclusion criteria. The research coordinator initially recruited them at the clinic and then communicated by phone either directly or via a CHW. This communication system via the CHW was used both during the pregnancy to arrange an OGTT appointment, and during the postpartum period to obtain birth outcomes or arrange a FPG for those who tested positive for diabetes. Women who travelled very long distances were given additional compensation to cover higher transportation costs. Less than two percent of husbands accompanied their wife to the OGTT appointment; the study

funding did not allow for transport compensation for family members, which likely limited the number of husbands in attendance.

The study population of 281 was relatively evenly divided between urban and rural. The mean age was 27 years with a range of 16–44 years. Women with a GDM diagnosis were older, had a history of HTN, higher BMI, and glycosuria, than women with normal glucose values. Fourteen (4.98%) were HIV positive and on ARVs; none of these women tested positive for diabetes.

Blood glucose values were analyzed and then stratified based on BMI categories, according to WHO BMI guidelines [18] (Table 2). Glucose values and prevalence varied significantly across the different categories, with the highest rates in the obese category (>30 kg/m^2). All women were within the GDM WHO guidelines for the FPG, 1-h, and 2-h values. The women's prepregnancy weights were not available, so the calculation was based on the height and weight of the measurements taken at the time of OGTT, and therefore, greater than the non-pregnant state.

The majority of women with GDM (8/9; 88.9%) were diagnosed using only the FPG value according to the WHO (2013) criteria (Table 3). One other woman (11.1%) was diagnosed with an abnormal 1-h post 75 g OGTT. Based on these findings; the FPG test had an 88.9% sensitivity in this study population.

Birth outcomes for all women are reported in Table 4. All birth outcomes were retrieved postpartum by January 6th, 2018, apart from one woman who had a fetal demise. Based on the gestational age, fundal height or ultrasound at the time of data collection, most neonates were at term (92.5%). The preterm births ranged from 31 weeks to 37.6 weeks gestation.

4. Discussion

The prevalence of GDM was 3.2% in the Rwandan population at the public health centers using the one-step IADPSG/WHO criteria. Of the nine women diagnosed with GDM, eight (89%) were diagnosed based on the FPG value of 5.1–6.9 mmol/l. All diagnosed with GDM were managed through nutrition modification alone, six from urban clinics and three from rural clinics. All women in the study gave a self-report of the birth outcomes, except for one who provided limited data due to a fetal demise believed to be unrelated to GDM. A FPG taken after six weeks postpartum revealed all serum glucose results had returned to normal values, indicating all nine had GDM, and therefore it is unlikely that any women had overt diabetes.

The prevalence rate of 3.2% (4.28% urban and 2.13% rural), was lower than anticipated, yet similar to the IDF prevalence estimate of 3.3% for adults in SSA [17], and a recent study in Kenya. Pastakia and colleagues [9] reported a slightly lower prevalence rate of 2.9% (95% Cl, 1.57–4.23%) in nearby Western Kenya. Our study population was quite similar, with women being highly active, even in pregnancy, and less likely to be obese. Macaulay and colleagues [10] reported a higher prevalence rate of 9.1% (95% CI 7.9–10.5) in a recent study in urban Soweto, South Africa. The authors cited a high obesity rate (47.5%) in the

study population, which was parallel to the general female population. All three recent GDM studies conducted in SSA used the IADPSG/WHO diagnostic criteria [3].

Other studies conducted in Africa include a systematic review [7], four cross-sectional studies [19–22] and a prospective study [23]. Authors of the review examined 14 studies in six African countries, which indicated prevalence rates from 0% to 13.9% [7]. In contrast to our findings, a study conducted in urban Rwanda reported an 8.3% prevalence rate using the WHO 2006 criteria [19]. Several other studies in SSA reported rates of 8.1% [20], and 5.85% [21] in Nigeria, 8.4% in Tanzania [22], and 9% in Ghana [23], which varies according to diagnostic criteria.

The nine women diagnosed with GDM according to the WHO 2013 criteria [3], were significantly older, had higher BMI, history of hypertension, and glycosuria. The median age of participants was 33.22 (29.50–36.94) years for those with GDM and 27.49 (26.75–28.31) years without, a significant difference (p = 0.004). Similarly, other studies reported women over 30 years [24,25], or 35 years [10] were at higher risk.

Women with GDM were significantly more obese or overweight than those without diabetes (p = 0.023), which concurs with other studies reporting that diabetes is highly correlated with obesity [9,10,15,26,27] The women's BMI was calculated based on their height and weight at the time of OGTT, and hence it was not an accurate measurement of their non-pregnant state.

Interestingly, women in the underweight category (<18.5 kg/m^2) had 1-h, and 2-h glucose values nearer to the overweight category than the normal category (Table 2). Admittedly, there were only two women; however, in a study in Japan underweight young women had a 6.30-fold (2.26–17.59) higher risk of developing GDM than women with normal BMI [28]. The authors of that study postulated that nutritional deficiencies might have metabolic consequences that predispose to GDM.

Women who were HIV positive and on antiviral medications (ARVs) were included in the study, and none were diagnosed with GDM. Our results concur with other studies, indicating no relationship between GDM and HIV women on ARVs [29], though efavirenz is one of the three combination first-line ARV medications used for prevention of mother-to-child transmission (PMTCT) [30], which is known to cause dysglycemia [31].

All women gave a self-report of their birth outcomes. We had a low macrosomia rate (3.6%), with an equal ratio of female to male (5:5) newborns. The proportion of preterm newborns was 7.5%, but of interest was the number of large preterm newborns. One woman, who had two previous term newborns weighing 4.3 kg and 5.0 kg, gave birth to a 3.7 kg newborn at 36.3 weeks. A newborn that large may appear to be at term, and yet might be a late preterm neonate (34.0–36.6 weeks) with the attendant prematurity and potential difficult transition to extrauterine life.

Our results indicate that FPG was the most predictive, similar to other studies in SSA [9,10,20,23]. The Rwandan women came prepared to be tested at the designated time and place, in the fasting state and amenable to venipuncture. We, therefore, recommend a

minimum of a FPG test be used as a GDM screening tool using the WHO 2013 criteria [3], particularly for those with risk factors, such as age 30 or older, BMI of 30 kg/m^2 or higher, and a medical history of diabetes or hypertension, or family history of T2DM. Though including diabetic history could pose a problem; only one woman in those with a previous pregnancy (n = 192) could recall a prior glucose test, and family history would likely be even more remote. A recent study of 609 pregnant women in Tanzania [22] indicated a screening tool using three criteria: family history of T2DM, previous stillbirth and mid-upper arm circumference (MUAC) predicted 6 out of 10 pregnant women at risk for GDM.

The majority of Rwandan women are physically active outdoors throughout the year, though their lifestyle may acclimatize as they become more affluent. Rwanda is a hilly country in Central/Eastern Africa with summer-like temperatures year round, which not only aids regular exercise, but the climate may also contribute to a lower GDM prevalence in another way. A recent study in South Australia, [32] reported a seasonal variation of GDM, with lower incidence among pregnancies conceived in summer and higher during winter conceptions. Furthermore, a movement toward a more Westernized lifestyle, including motorized transportation, would likely lead to more obesity as seen in adults and children in developed countries [1]. A future study should include antenatal women attending private health clinics, and prepregnancy weight and MUAC measurements.

This study had several limitations. It was conducted at only 10 public health centers, and thus the prevalence is only an estimate of the true prevalence and not generalizable to pregnant women throughout Rwanda. Many women wanted to be included, but were outside the 24–32 week gestational range, though some who were early in their pregnancy waited until eligible. There was a potential for sampling bias even though all participants attended the public ANC centers and were considered on the same lower socio-demographic scale. Since the GDM testing was an additional activity, perhaps those who participated were more physically active, and therefore their glucose level might be lower than women who chose not to be tested.

5.   Conclusion

This study adds important information about the prevalence of GDM in Rwanda, a resource-limited country. Although the prevalence of 3.2% was low, significant risk factors for GDM were identified. We anticipate that the risk factors for developing GDM will increase in the near future, similar to the global trend of obesity and diabetes, necessitating continued research and education in this important condition that carries a double burden of disease to both mothers and infants.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

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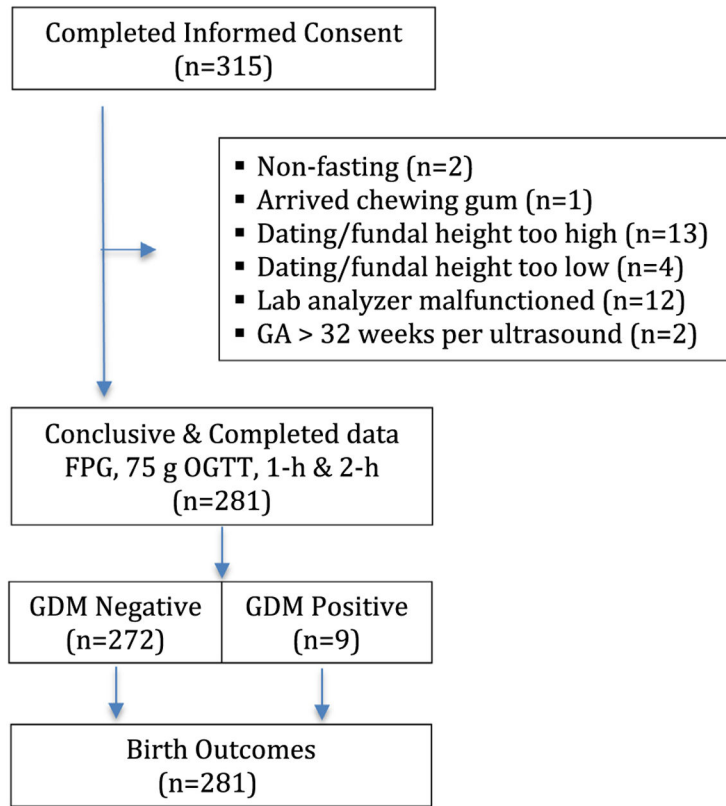
Fig. 1 –.
Study schema.

Table 1 –

Characteristics of study participants.

Characteristics	Total (n = 281)	Normal glucose (n = 272)	GDM Dx (n = 9)	*P*-Value
Study location				
Urban	140 (49.8)	134 (49.3)	6 (66.7)	0.335
Rural	141 (50.2)	138 (50.7)	3 (33.3)	
Age (years)[a]	27.68 ± 5.86	27.49 ± 5.81	33.22 ± 4.84	0.004
	(27.00–28.37)	(26.75–28.31)	(29.50–36.94)	
Gestational Age (Wks)[a]	29.33 ± 1.9	29.32 ± 1.9	29.46 ±1.9	0.937
	(29.10–29.55)	(29.09–29.55)	(28.02–30.91)	
Previous Births				
None	89 (31.7)	87 (32)	2 (22.2)	0.248
1–2	133 (47.3)	130 (47.8)	3 (33.3)	
3	59 (21.0)	55 (20.2)	4 (44.4)	
LGA (4 kg)	51 (18.1)	49 (18.0)	2 (22.2)	0.669
Previous AB or Stillbirth	40 (14.3)	37 (13.6)	3 (33.3)	0.122
Medical Problems				
None	256 (91.1)	249 (91.5)	7 (77.8)	0.186
HTN	11 (3.9)	9 (3.3)	2 (22.2)	0.043
HIV	14 (5.0)	14 (5.2)	0 (0)	0.999
Family History				
None	254 (90.4)	245 (90.1)	9 (100)	
T2DM	13 (4.6)	13 (4.6)	0 (0)	0.804
HTN	18 (6.4)	18 (6.6)	0 (0)	
Height (cm)[a]	160.22 ± 6.82	160.28 ± 6.82	158.56 ±6.77	0.378
	(159.4–161.0)	(159.5–161.1)	(153.4–163.8)	
Weight (kg)[ac]	62.44 ± 9.77	62.21 ± 9.65	69.33 ±11.73	0.057
	(61.29–63.59)	(61.06–63.36)	(60.32–78.35)	
BMI[c]	24.36 ± 3.47	24.25 ± 3.38	27.60 ± 4.86	0.023
	(23.95–24.77)	(23.85–24.66)	(23.87–31.33)	

Characteristics	Total (n = 281)	Normal glucose (n = 272)	GDM Dx (n = 9)	P-Value
Underweight [b]	2 (0.7)	2 (0.7)	0 (0)	0.131
Normal	172 (61.2)	169 (62.1)	3 (33.3)	
Overweight	89 (31.7)	85 (31.3)	4 (44.5)	
Obese	18 (6.4)	16 (5.9)	2 (22.2)	
SBP > 140 or DBP > 90	21 (7.5)	20 (7.4)	1 (11.1)	0.508
Urine Glucose				
Negative	261 (92.9)	256 (94.1)	5 (55.6)	<0.0001
Trace	10 (3.6)	9 (3.3)	1 (11.1)	
+1	5 (1.8)	5 (1.8)	0 (0)	
+2 or +3	5 (1.8)	2 (0.8)	3 (33.3)	

LGA Large for gestational age, GDM Gestational diabetes mellitus, HTN Hypertension, T2DM Type 2 Diabetes mellitus, SBP Systolic blood pressure, DBP Diastolic blood pressure, Wks Weeks.

[a] Means and CI. (maternal age, gestational age).

[b] Fischer's Exact test.

[c] Weight in Pregnancy at time of OGTT.

Table 2 –

Glucose values across BMI categories.

BMI (kg/m²)	Under weight <18.5 (N =2)	Normal 18.5–24.99 (N = 172)	Overweight 25.00–29.99 (N = 89)	Obese 30.00 (N = 18)	p-value
FPG (mmol/l)	3.7	4.0	4.1	4.4	<0.0001 *
Median ^ (mmol/l)	3.6–3.7	3.7–4.3)	3.9–4.5	4.2–4.8	
1-h GTT (mmol/l)	6.1	5.7	6.2	7.1	0.001 *
Median ^ (mmol/l)	5.9–6.1	5.0–6.5	5.3–7.1	6.7–7.5	
2-h GTT (mmol/l)	5.4	5.3	5.4	6.0	0.084 *
Median ^ (mmol/l)	4.7–5.4	4.7–6.0	5.1–6.0	5.2–6.2	
GDM Diagnosis n(%)	0/2 (0)	3/172 (1.7)	4/89 (4.5)	2/18 (11.1)	0.131 **

^
IQR.

*
p-value calculated using Kruskal-Wallis.

**
p-value calculated using Fisher's exact test.

Table 3 –

GDM prevalence at specific thresholds using WHO (2013) criteria [3].

Women diagnosed n(%)	
GDM diagnosis based on FPG	8 (88.9)
FPG (5.1–6.9 mmol/l) alone	4 (44.4)
FPG + 1-h (>10.0 mmol/l)	1 (11.1)
FPG + 2-h (8.5–11.0 mmol/l)	1 (11.1)
FPG + 1-h + 2 h post 75 g	2 (22.2)
1-h post 75 g OGTT (>10 mmol/l)	1 (11.1)
Total GDM diagnosis	9 (100)

GDM Gestational diabetes mellitus, FPG Fasting plasma glucose, OGTT Oral glucose tolerance test.

Table 4 –

Birth outcomes.

	Total (*n* = 281) n(%)	Normal glucose (*n* = 272) n(%)	GDM Diagnosis (*n* = 9) n(%)	P-Value
Gestational age				
Term	260(92.5)	253(93.0)	7(77.8)	0.102
Preterm	21(7.5)	19(7.0)	2(22.2)	
Birth type				
Vaginal	230(81.9)	227(83.5)	3(33.3)	0.002
Cesarean	51(19.1)	45(16.5)	6(67.7)	
Birth weight (kg) *				
<2.5	5(1.8)	4(1.5)	1(11.1)	0.009
2.5–3.9	265(94.6)	259(95.6)	6(66.7)	
4.0	10(3.6)	8(2.9)	2(22.2)	
Gender *				
Female	139(49.5)	135(49.8)	4(44.4)	0.999
Male	141(50.2)	136(50.2)	5(55.6)	
NICU admission	5(1.8)	4(1.5)	1(11.1)	0.152
Fetal demise *	1(0.4)	1(0.4)	0(0)	0.999

*
No data on the gender and weight of one newborn.