Postpartum Diabetes Screening

Adherence rate and the performance of fasting plasma glucose versus oral glucose tolerance test

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OBJECTIVE — To determine the rate of adherence to postpartum glycemic testing in women with gestational diabetes mellitus (GDM) and the performance of fasting plasma glucose (FPG) versus the 75-g oral glucose tolerance test (OGTT) in detecting postpartum glucose intolerance.

RESEARCH DESIGN AND METHODS — The study was a retrospective cohort of 1,006 women with GDM attending a pregnancy diabetes clinic.

RESULTS — Postpartum screening was completed in 438 (48%) women. Women nonadherent to testing had higher parity (1.10 vs. 0.87) and were less likely to require insulin for management of their GDM. Among women who were tested, 89 (21%) had an abnormal result, only 25 (28%) of whom were identified by FPG. Factors associated with abnormal postpartum diabetes screening include non-Caucasian ethnicity, previous GDM, higher A1C, and OGTT values during pregnancy and treatment with insulin.

CONCLUSIONS — The rate of postpartum diabetes screening is low, and FPG lacks sensitivity as a screening test in comparison with OGTT.

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Gestational diabetes mellitus (GDM) strongly predicts future development of type 2 diabetes (1), and abnormal glucose tolerance can persist postpartum leading to impaired fasting glucose (IFG), impaired glucose tolerance (IGT), and type 2 diabetes (2). Compared with an oral glucose tolerance test (OGTT), fasting plasma glucose (FPG) has greater reproducibility but may lack sensitivity to identify women with IGT or type 2 diabetes (3–5). The main study objectives were to assess adherence with postpartum testing, to identify factors associated with nonadherence, and to compare the sensitivity of FPG versus a 75-g OGTT in detecting postpartum glucose intolerance.

RESEARCH DESIGN AND METHODS

— A retrospective cohort study was conducted in women with GDM and IGT of pregnancy seen at the Grey Nuns Community Hospital Gestational Diabetes Clinic, Edmonton, Alberta, from April 1999 to March 2006. The study was approved by the University of Alberta Health Research Ethics Board. Women were referred to the clinic based on screening at 24–32 weeks' gestation as per existing Canadian guidelines (6). A 1-h plasma glucose (PG) measurement after a 50-g glucose load of ≥10.3 mmol/l was considered as diagnostic of GDM, and <7.8 mmol/l was considered normal (7). An indeterminate value (7.8–10.2 mmol/l) prompted a 75-g OGTT, with two or more abnormal values (FPG ≥5.3 mmol/l, 1-h PG ≥10.6 mmol/l, and 2-h PG ≥8.9 mmol/l) (7) diagnostic of GDM, and a single elevated value was diagnostic of IGT of pregnancy.

All consecutive women with GDM or IGT of pregnancy were included. Women with preexisting hyperglycemia (type 1 or type 2 diabetes, IFG, or IGT) and those who did not undergo a routine gestational diabetic screen were excluded. Data were obtained from patient medical records, including age, parity, ethnicity (Caucasian versus non-Caucasian), self-reported prior history of GDM and family history of diabetes (first- or second-degree relatives), self-reported prepregnancy weight and BMI, initial A1C value, insulin use during pregnancy (yes versus no), and postpartum diabetes screening values (FPG or 75-g OGTT). Diabetes was defined as FPG ≥7 mmol/l or 2-h PG ≥11.1 mmol/l, IFG as FPG of 6.1–6.9 mmol/l, and IGT as 2-h PG of 7.8–11.1 mmol/l (6). To promote adherence to postpartum testing, requisitions were given to women at 35–40 weeks' gestation for testing between 6 weeks and 6 months postpartum, and they received a phone reminder if testing was not completed by 6 months.

The data were tabulated in Microsoft Excel software (Microsoft, Redmond, WA). The χ^2 test for categorical or *t* test for continuous variables and logistic regression with calculation of odds ratio for significant values were used to analyze for differences between the women who underwent postpartum testing and those who did not and for the variables associated with postpartum hyperglycemia.

RESULTS

— A total of 1,006 women were seen at the clinic between April 1999 and March 2006, of whom 97 were excluded. Table 1 presents the characteristics of the 909 study participants. There were 438 (48.2%) women who underwent postpartum testing, in whom 21 only completed an FPG. Women nonadherent to testing had a higher parity (odds ratio [OR] 1.39, $P = 0.02$, nulliparity versus higher parity) and were less likely to have used insulin (OR 0.65, $P = 0.003$) during pregnancy than women who adhered to testing but did not otherwise differ (Table 1). A total of 14 women who had postpartum testing were diagnosed with type 2 diabetes, while 15 had IFG, 57 had IGT, and 3 had both. The FPG and OGTT were abnormal in 25 (5.7%) and 89 (21.3%) women, respectively, whereas only five women had both abnormal FPG and 2-h PG values. If only an FPG was

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Table 1—*Characteristics of women by adherence to postpartum glucose testing status*

	Total study cohort	Adherent to postpartum testing	Nonadherent to postpartum testing	*P*
n	909	438	471	
Age (years)	31.7 ± 4.9	32.0 ± 4.5	31.4 ± 5.1	0.06
Parity	0.99 ± 1.1	0.87 ± 0.97	1.10 ± 1.20	0.002*
Ethnicity				
Caucasian	529 (58.3)	247 (56.4)	282 (60.1)	0.34
Non-Caucasian	379 (42.7)	190 (43.4)	189 (39.9)	
Previous GDM				
Present	186 (20.6)	83 (18.9)	103 (21.9)	0.28
Absent	715 (79.4)	353 (80.6)	362 (76.8)	
Family history of diabetes				
Present	596 (66.4)	286 (65.3)	310 (65.8)	0.87
Absent	301 (33.6)	147 (33.6)	154 (32.7)	
OGTT during pregnancy (mmol/l)				
Fasting	5.0 ± 0.7	5.0 ± 0.7	5.0 ± 0.7	0.75
1-h PG	10.9 ± 1.4	11.0 ± 1.5	10.9 ± 1.4	0.20
2-h PG	8.8 ± 1.5	8.9 ± 1.6	8.8 ± 1.5	0.69
GDM screen (mmol/l)	11.5 ± 1.2	11.3 ± 1.5	11.2 ± 1.3	0.31
Prepregnancy BMI (kg/m^2)	27.7 ± 6.5	27.7 ± 6.2	27.7 ± 6.8	0.85
A1C during pregnancy (%)	5.56 ± 0.53	5.7 ± 0.5	5.6 ± 0.6	0.88
Insulin use during pregnancy				
Present	549 (61.0)	287 (65.6)	262 (55.6)	0.003*
Absent	350 (38.9)	146 (33.3)	204 (43.3)	

Data are *n* (%) or means ± SD. *P* values were calculated with χ^2 test for categorical or *t* test for continuous variables. *Significantly different between women adherent and nonadherent to postpartum testing.

performed, 72% of women with postpartum hyperglycemia would have been missed.

Among the characteristics examined, postpartum hyperglycemia was significantly associated with non-Caucasian ethnicity (OR 3.72, $P < 0.001$), previous GDM (OR 2.07, $P = 0.01$), higher pregnancy OGTT values (fasting 5.20 ± 0.73 vs. 4.96 ± 0.63 mmol/l, $P = 0.01$; 1-h PG 11.74 ± 1.31 vs. 10.86 ± 1.45 mmol/l, $P = 0.001$; 2-h PG 9.43 ± 1.71 vs. 8.73 ± 1.51, $P = 0.003$), higher A1C value (5.75 ± 0.61 vs. 5.50 ± 0.49, $P = 0.001$), and the use of insulin during pregnancy (OR 2.53, $P = 0.002$).

CONCLUSIONS — Despite attempts to improve adherence, <50% of our cohort underwent postpartum testing for glucose intolerance, and only higher parity and lack of insulin use were significantly associated with nonadherence to testing. Lack of child care as reflected by a higher parity may hinder testing, as has been previously reported (8). Insulin use in pregnancy may lead to a greater perceived risk of postpartum hyperglycemia among patients, but its role in promoting adherence to postpartum testing has been discrepant in the literature (8,9), the reason for which is unclear. The contribution of socioeconomic status to general nonadherence to medical recommendation has been previously reported (10) but was not examined in this study. Possible contributors to the relatively low adherence rate include conflicting guidelines from the Canadian Diabetes Association versus the Society of Obstetrics and Gynecologists of Canada (11,12) and ambiguity as to which provider should arrange for testing (13), while a lack of medical resources unlikely contributes given a previously reported high adherence with postpartum cervical screening (14). Although phone reminders were used, a case manager and/or in-person postpartum follow-up may further improve adherence (8).

FPG is an inadequate screening tool to detect postpartum hyperglycemia, since the majority of cases will be missed. The lowering of FPG to 5.6 mmol/l has been suggested to improve diagnostic sensitivity in IFG, since this value more accurately reflects the increased risk for development of future diabetes or cardiovascular disease (15). However, even if a FPG cutoff of 5.6 mmol/l was applied to the cohort, 56% of cases of hyperglycemia would be missed without completion of the 75-g OGTT.

Poor adherence to postpartum testing precludes early detection and timely intervention among these at-risk women. Given the rising incidence of postgestational hyperglycemia (1) and a lack of reliable predictors to identify nonadherence to postpartum testing, universal screening with an OGTT should be applied to this high-risk population.

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