

412 Cloud-based glucose monitoring for pregnancies with diabetes: Implications of testing adherence to perinatal complications



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OBJECTIVE: Validated reports of patient adherence to self-glucose monitoring and associated perinatal outcomes are limited. Using cloud based self-glucose monitoring technology, we asked the following questions:

1. Are there differences in rates of testing adherence based on type of diabetes in pregnancy?
2. Is adherence to glucose monitoring recommendations associated with perinatal outcomes in pregnancies complicated by diabetes?

STUDY DESIGN: This prospective, single-center, cohort study included women with type 2 diabetes (T2DM) and gestational diabetes (GDM) enrolled in a perinatal diabetes program before 29 weeks gestation between December 2015 and June 2018. All women received a cellular-enabled glucometer that uploaded glucose values to a cloud-based, HIPAA compliant platform in real time. Four glucose checks were advised daily and percent adherence was calculated. The study was powered for the primary outcome of adherence to advised self-glucose monitoring by diabetes type and large for gestational age (LGA) fetuses. Secondary outcomes were preeclampsia, cesarean delivery (CD) and neonatal hypoglycemia.

RESULTS: 102 eligible women were included in the study. Baseline characteristics differed between groups with women with T2DM having higher HgbA1c and BMI when compared to women with GDM. No differences were noted in age or parity. Adherence was calculated over 20±6 weeks for women with T2DM compared to 9±4 weeks for women with GDM. Overall adherence to glucose monitoring was significantly less for women with T2DM compared to those with GDM. Testing adherence rates were 51%, 66% and 70% for T2DM, GDMA1 and GDMA2 respectively ($p=0.016$).

Using logistic regression, the odds of CD, neonatal hypoglycemia and LGA fetuses decreased by 15-20% for every for every 10% increase in adherence (Table 1). There was no association between adherence and rates of preeclampsia.

CONCLUSION: Using a cellular-enabled and cloud-based glucometer that ensures accurate reporting of testing adherence, this study shows that overall adherence to testing recommendations differs by diabetes type and is associated with neonatal outcomes. Improved outcomes with higher adherence may reflect more timely medication adjustments in response to real-time glucose values. Programs aimed at improving adherence could prove beneficial.

	Uncontrolled OR* (95% CI)	p
Maternal outcome		
Cesarean Delivery	0.793 (0.687 – 0.916)	0.002
Preeclampsia	0.959 (0.812 – 1.133)	0.622
Neonatal Outcome		
Hypoglycemia	0.851 (0.739 -0.980)	0.025
Large for gestational age	0.818 (0.689 – 0.970)	0.025

*Odds ratios calculated for every 10 % increase in adherence.

413 Prevalence of shoulder dystocia by maternal body composition and diabetes status



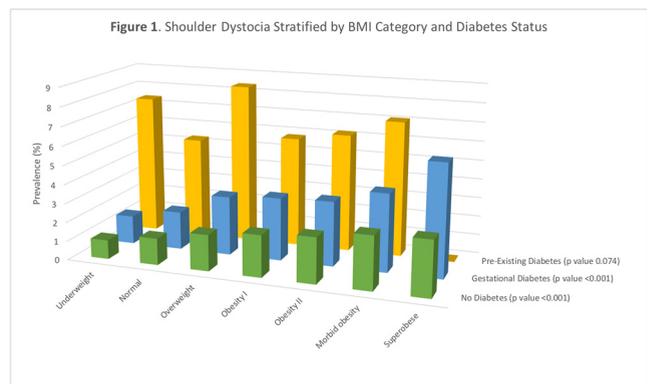
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OBJECTIVE: We sought to examine the association between body mass index (BMI) and shoulder dystocia in women with pre-existing diabetes, with gestational diabetes, and without diabetes.

STUDY DESIGN: This is a retrospective cohort study of women with singleton, non-anomalous, term pregnancies between 2007 and 2011 using linked vital statistics and ICD-9 data. Chi-square tests were used to compare rates of shoulder dystocia in diabetic and non-diabetic women categorized by BMI class. Pre-pregnancy BMI was categorized into underweight (<18.5 kg/m²), normal weight (18.5-24.9 kg/m²), overweight (25-29.9 kg/m²), obesity I (30-34.9 kg/m²), obesity II (35.39.9 kg/m²), morbid obesity (40-49 kg/m²) and super obesity (>50 kg/m²). Multivariable logistic regression was used to estimate adjusted odds ratio (aOR) of shoulder dystocia by BMI class and by diabetes classification, controlling for maternal height, race/ethnicity, age, education, insurance status, and prenatal care.

RESULTS: The cohort of 1,384,790 consisted of 232,925 (16.8%) obese pregnant women. Overall, we found that higher BMI class was associated with increased odds of shoulder dystocia, independent of diabetes status (Figure 1). Underweight pre-pregnancy BMI was associated with decreased odds of shoulder dystocia when compared to normal weight. When compared to women without diabetes, those with gestational and pre-existing diabetes had significantly increased odds of shoulder dystocia (aOR 1.50, 95% CI 1.43-1.57; aOR 3.04 95% CI 2.68-3.46, respectively) (Table 1). A significant association was demonstrated between BMI category and shoulder dystocia for those with gestational diabetes and no diabetes. In contrast, we did not find a statistically significant relationship between BMI class and shoulder dystocia among women with pre-existing diabetes.

CONCLUSION: Diabetes status and higher BMI category are associated with increasing prevalence of shoulder dystocia. Prenatal education for women in these categories should emphasize the potential of shoulder dystocia as an adverse obstetrical outcome.



BMI Category	Shoulder Dystocia with Pre-Existing Diabetes	Shoulder Dystocia with Gestational Diabetes	Shoulder Dystocia with No Diabetes	aOR (95% CI) by BMI
Underweight n = 53,486	7.4%	1.5%	1.0%	0.73 (0.67-0.80)
Normal weight n = 740,804	5.3%	2.0%	1.4%	1.00 (referent)
Overweight n = 347,855	8.4%	3.1%	1.9%	1.35 (1.31-1.40)
Obesity I n = 151,286	5.8%	3.3%	2.2%	1.54 (1.48-1.61)
Obesity II n = 54,942	6.2%	3.4%	2.4%	1.68 (1.58-1.79)
Morbid obesity n = 24,452	7.1%	4.1%	2.8%	1.86 (1.72-2.02)
Superobese n = 2,243	0%	5.9%	2.9%	1.89 (1.47-2.44)
aOR (95% CI) by Diabetes Status	3.04 (2.68-3.46)	1.50 (1.43-1.57)	1.00 (referent)	

414 High-normal 50-gram glucose challenge test and future metabolic diseases: a population-based study

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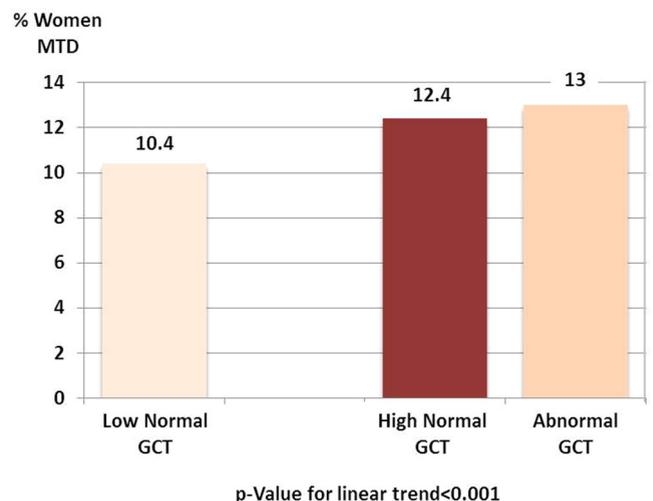
OBJECTIVE: A 1-hour 50-gram glucose challenge test (GCT) is the first step in the screening for gestational diabetes mellitus (GDM). Accumulating evidence show that women with high-normal GCT levels are at elevated risk for immediate obstetric complications such as large for gestational age newborns and greater likelihood for caesarean delivery. We sought to examine the risk for metabolic disorders later in life, among women with high-normal GCT levels, as compared to low normal and abnormal GCT.

STUDY DESIGN: This cohort study included all pregnant women who underwent GCT between the years 2005 to 2018 at the Central District of Clalit Health Services, the largest health maintenance organization in Israel. Rates of metabolic diseases (MTD) were compared between the three study groups: women with history of only Low-normal GCT (<124 mg/dL), High normal (125- 139 mg/dL) and abnormal GCT >140 mg/dL. Data on maternal ages and GCT results for each test performed, as well as MTD such as diabetes and obesity were collected and analyzed from the computerized database. Multivariable survival model was used to study the

association between GCT levels and MTD risk, while adjusting for maternal age.

RESULTS: A total of 66,869 women performed 1 to 10 GCTs to a total of 117,435 tests during the study period; 23% of study participants (n=15,360) had at least one abnormal result; 11.3% (n=7566) of participants had a diagnosis of MTD. As compared to women with low normal GCT (only), women with a history of high normal and abnormal GCT were at higher risk for MTD (10.4% vs. 12.4% and 13.0%, p<0.001, age adjusted HR=1.18; 95%CI 1.09-1.24, and 1.18; 95%CI 1.11-1.25, for high normal and abnormal GCT, respectively). There was no significant difference in MTD risk between women with history of high normal and abnormal GCT results (age adjusted HR=1.02; 95%CI 0.94-1.10; p=0.67).

CONCLUSION: As compared to women with low normal GCT, women with high normal GCT, similarly to women with abnormal GCT, are at increased MTD risk. Although GCT is a screening test, it may be a predictor of MTD later in life, and women with high normal GCT results may benefit from close monitoring of their metabolic status.



415 Family history of diabetes mellitus and long-term endocrine morbidity of the offspring

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OBJECTIVE: Diabetes mellitus (DM) is associated with significant maternal and perinatal morbidity, including endocrine dysfunction, cardiovascular, and renal diseases. The aim of the present study was to determine whether being born to non-diabetic mother with family history of DM increases the risk for long-term endocrine morbidity of the offspring.

STUDY DESIGN: A population-based cohort study, comparing long-term endocrine morbidity of offspring of non-diabetic mothers with and without a family history of DM was conducted. All singleton deliveries between the years 1991-2014 in a tertiary medical center were included. Maternal DM or gestational diabetes mellitus (GDM), children with congenital malformations or chromosomal abnormalities and pregnancies without prenatal care were excluded from the study. The study groups were followed until they were 18 years of age for endocrine-related morbidity. Kaplan-Meier survival curve was used to compare cumulative incidence of long-term endocrine morbidity, and a Cox proportional hazards model was constructed to control for confounders.