Table 1. BMI Category and Prevalence of Shoulder Dystocia by Diabetes Status in Singleton Gestations

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 = 63,486	7.4%	1.5%	1.0%	0.73 (0.67-0.80)
Normal weight n = 740,604	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 = 151,288	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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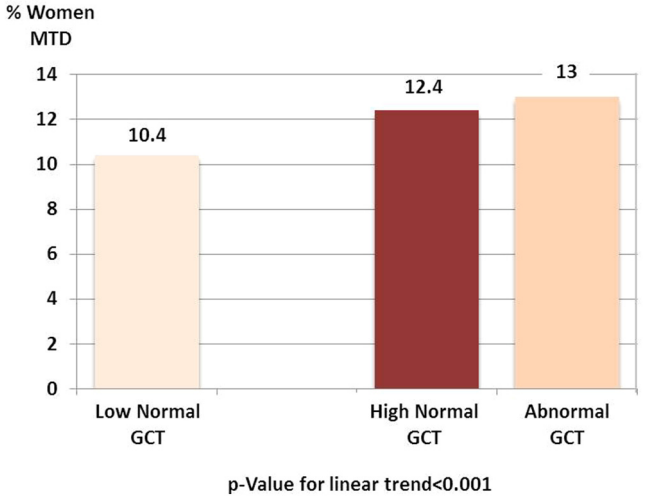
OBJECTIVE: A 1-hour 50-gram glucose challenge test (GCT) is the first step in the screening for gestational diabetes mellitus (GDM). Accumulating evidence show that women with high- normal GCT levels are at elevated risk for immediate obstetric complications such as large for gestational age newborns 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.

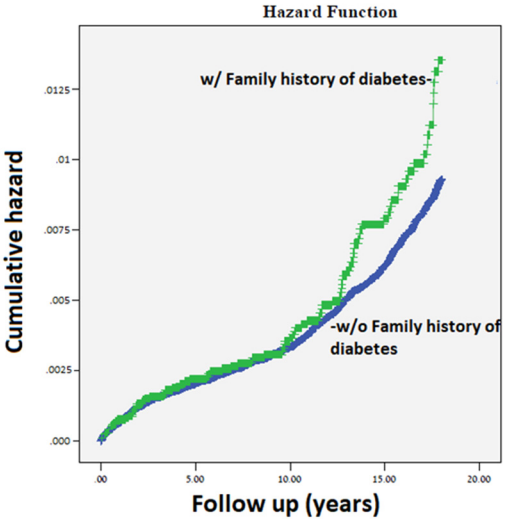
RESULTS: During the study period 208,728 deliveries met the inclusion criteria, of them 8.2% (n=17040) were of non- diabetic mothers with family history of DM. Offspring born to non-diabetic mothers with family history of DM had higher risk cumulative incidence of long-term endocrine morbidity as compared with those without family history of DM (Kaplan-Meier log rank test P<0.029, Figure). Using a Cox proportional hazards model, controlling for confounders such as maternal age, hypertensive disorders of pregnancy, birth-weight and caesarian delivery, being born to a non-diabetic mother with family history of DM was found to be an independent risk factor for long- term endocrine morbidity of the offspring (adjusted HR=1.24, 95% CI 1.01-1.54; P=0.043, Table).

CONCLUSION: Being born to a non-diabetic mother with a family history of DM is independently associated with higher risk for long-term endocrine morbidity of the offspring.

Cox proportional hazards model prediction long-term endocrine morbidity of the offspring

Variable	OR	95% CI	p-value
Family history of diabetes mellitus	1.24	1.01-1.54	0.043
Maternal age (years)	1.00	0.99-1.01	0.233
Hypertensive disorders	1.37	1.07-1.74	0.010
Birth-weight (grams)	1.00	1.00-1.00	0.041
Caesarian delivery	1.35	1.13-1.62	0.001

Kaplan-Meier survival curve demonstrating the cumulative incidence of long-term endocrine morbidity of the offspring according to maternal family history of DM (Log rank, P=0.029)



416 Rate of Doppler abnormalities in small for gestational age twin and singleton fetuses

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OBJECTIVE: Twin fetuses grow slower during the 3rd trimester compared with singletons. Whether the relative smallness of twins is the result of placental dysfunction (as in singletons) or whether it reflects a benign adaptive response to the competitive uterine environment is yet unclear. This question is important as it determines whether small for gestational age (SGA) twins need to be managed similar to SGA singletons. We previously reported that SGA twins have a lower rate of abnormal placental pathology compared with SGA singletons, supporting the hypothesis that the smallness of twins may be more benign than in singletons. In the current study we aimed to further test this hypothesis by comparing the rate of Doppler abnormalities, as a specific antenatal measure for placental dysfunction, between SGA twins and SGA singleton fetuses.

STUDY DESIGN: We conducted a retrospective cohort study of SGA dichorionic twin and singleton fetuses (birth weight <10th percentile for gestational age) born in a single tertiary center in Toronto, Ontario between 2010-2017 and for which Doppler data was available. Doppler findings in the most recent ultrasound report prior to birth were compared between SGA twins and singletons. Doppler abnormalities included elevated umbilical artery pulsatility index (UA-PI) >95th%, absent/reverse diastolic flow (AREDF) in the umbilical artery, low middle cerebral artery pulsatility index (MCA-PI)<5th% and low cerebroplacental ratio (CPR)<5th%.

RESULTS: Overall 1,121 SGA singleton and 375 SGA twin fetuses were included. Twins were born earlier than singletons (35.8±2.3 weeks vs. 37.5±3.4 weeks, p<0.001). In the overall cohort, the rate of Doppler abnormalities was similar for SGA twins and SGA singletons, except for a higher rate of AREDF in the singletons group (4.3% vs. 1.1%, p=0.003) (Table 1). These findings persisted in the subgroup of SGA fetuses born at <34 weeks (Table 2). However, for SGA fetuses born at 34-37 weeks, twins had a significantly lower rate of any Doppler abnormality (22.3% vs. 33.1%, p=0.007), MCA-PI<5th percentile (14.8% vs. 23.6%, p=0.012) and CPR<5th percentile (17.0% vs. 26.0%, p=0.014) (Table 2). The number of twins born after 37 weeks was too small to allow for proper interpretation.

CONCLUSION: Our findings provide support to the hypothesis that the relative smallness of twin fetuses during the 3rd trimester is likely to reflect a benign adaptive process rather than pathological fetal growth restriction.

Table 1. Doppler abnormalities in all SGA twins and singleton fetuses

Doppler indices	Overall cohort		
	Twins (n=375)	Singletons (n=1,121)	p-value
Any Doppler abnormality	86 (22.9%)	230 (20.5%)	0.321
UAPI>95th percentile	19 (5.1%)	35 (3.1%)	0.081
MCA PI<5th percentile	57 (15.2%)	163 (14.5%)	0.755
CPR<5th percentile	59 (15.7%)	138 (12.3%)	0.090
REDF or AEDF	4 (1.1%)	48 (4.3%)	**0.003**