Prevalence and Risk Factors of Gestational Diabetes in Twin Pregnancies: Population Based Study

Objective: To assess the prevalence and risk factors of gestational diabetes (GDM) in twin compared with singleton pregnancies.

Methods: Population-based study using CDC birth data from 2016-2020. Higher order pregnancies and pre-pregnancy diabetes were excluded. A Chi-square test of independence was performed to identify significant factors associated with GDM in twin versus singleton pregnancies and within each group independently. Multivariable regression analyses were performed first to assess risk factors that are significantly associated with GDM in twins and second to assess the risk of GDM in twin compared with singletons, adjusted for the significant risk factors. P value<0.01 was considered statistically significant

Results: Total of 18,173,365 singleton and 611,043 twin pregnancies were included during the study period. Following the regression model, maternal age≥30 years, nulliparous, IVF, chronic hypertension, Hispanic and Non-Hispanic (NH) Asian, foreign-born, overweight and obesity class I/II/II remained significantly associated with GDM in twins. However, maternal age<25 years, NH Black, and W.I.C program reduced that risk. Factors that more than doubled the risk in twins were maternal age≥40 years (OR 2.06 (1.97 – 2.14), P<0.001), NH Asian (OR 2.12 (2.04 – 2.20), P<0.001), and obesity class I, II, and III (OR: 2.22 (2.16 – 2.29), P<0.001, OR:3.01 (2.92 – 3.11), P<0.001, OR: 3.80 (3.67 – 3.93), p<0.001, respectively). Following adjustment for all the significant risk factors, twin pregnancy remained significantly associated with increasing the risk of GDM in twin compared to singleton pregnancies (OR 1.22 (1.21 – 1.23), P<0.001).

Conclusion: Of the significant risk factors, maternal age≥40 years, NH Asian, and obesity class I, II, and III more than doubled the risk of GDM in twins. Regardless of maternal demographics, obstetric history, and endocrine factors, twin pregnancy remained significantly associated with GDM compared to singleton pregnancies. These factors can be used in risk prediction models to better counsel and manage twin pregnancies.

Table 1. Fully Adjusted Multivariate Logistic Model for Risk of GDM in Twin and Singleton Pregnancies

	Twin Pregnancies		Singleton Pregnancies	
	aOR* (95% CI)	*p-value*	aOR* (95% CI)	*p-value*
Maternal Age (years)				
<20	0.51 (0.46 – 0.57)	*< 0.001*	0.42 (0.41 – 0.43)	*< 0.001*
20-24	0.68 (0.63 – 0.71)	*< 0.001*	0.65 (0.66 – 0.67)	*< 0.001*
25-29	1.0 (ref)	-	1.0 (ref)	-
30-34	1.35 (1.32 – 1.39)	*< 0.001*	1.42 (1.41 – 1.43)	*< 0.001*
35-39	1.70 (1.65 – 1.74)	*< 0.001*	1.92 (1.90 – 1.93)	*< 0.001*
>40	2.06 (1.97 – 2.14)	*< 0.001*	2.52 (2.50 – 2.54)	*< 0.001*
Parity				
Multiparous	1.0 (ref)	-	1.0 (ref)	-
Nulliparous	1.04 (1.01 – 1.06)	*0.001*	1.12 (1.11 – 1.13)	*< 0.001*
Infertility Treatment Use				
No infertility treatment	1.0 (ref)	-	1.0 (ref)	-
Asst. reproductive technology	1.30 (1.26 – 1.34)	*< 0.001*	1.23 (1.21 – 1.25)	*< 0.001*
Pre-pregnancy Hypertension				
No	1.0 (ref)	-	1.0 (ref)	-
Yes	1.71 (1.64 – 1.78)	*< 0.001*	1.76 (1.75 – 1.78)	*< 0.001*
Maternal Race/Ethnicity				
NH white	1.0 (ref)	-	1.0 (ref)	-
NH black	0.61 (0.59 – 0.63)	*< 0.001*	0.73 (0.72 – 0.74)	*< 0.001*
NH Asian	2.12 (2.04 – 2.20)	*< 0.001*	2.16 (2.14 – 2.17)	*< 0.001*
Hispanic	0.97 (0.95 – 1.05)	*0.120*	1.04 (1.03 – 1.05)	*< 0.001*
NH others	1.03 (0.98 – 1.09)	*0.199*	1.21 (1.19 – 1.22)	*< 0.001*
Maternal Nativity				
Inside US	1.0 (ref)	-	1.0 (ref)	-
Outside Us	1.39 (1.35 – 1.42)	*< 0.001*	1.40 (1.39 – 1.41)	*< 0.001*
W.I.C				
No	1.0 (ref)	-	1.0 (ref)	-
Yes	1.09 (1.06 – 1.12)	*< 0.001*	1.11 (1.10 – 1.12)	*< 0.001*
BMI				
Normal	1.0 (ref)	-	1.0 (ref)	-
Overweight	1.55 (1.51 – 1.59)	*< 0.001*	1.79 (1.78 – 1.80)	*< 0.001*
Obese I	2.22 (2.16 – 2.29)	*< 0.001*	2.86 (2.84 – 2.87)	*< 0.001*
Obese II	3.01 (2.92 – 3.11)	*< 0.001*	3.93 (3.91 – 3.96)	*< 0.001*
Morbidly Obese	3.80 (3.67 – 3.93)	*< 0.001*	5.06 (5.13 – 5.09)	*< 0.001*
Prior Preterm Birth				
No	1.0 (ref)	-	1.0 (ref)	-
Yes	1.27 (1.22 – 1.32)	*< 0.001*	1.40 (1.39 – 1.42)	*< 0.001*

Adjusted for maternal age, BMI, infertility treatment, race/ethnicity, pre-pregnancy hypertension, prior preterm birth, payment source for delivery, smoking, education, nativity, parity, and W.I.C.

Table 2 . Logistic Model for Risk of GDM in Twin Compared to Singleton Pregnancies

	Logistic Model			
	Crude OR (95% CI)	*p-value*	**aOR* (95% CI)**	*p-value*
Plurality				
Singleton	1.0 (ref)	-	1.0 (ref)	-
Twin	1.36 (1.35 – 1.37)	*< 0.001*	1.22 (1.21 – 1.23)	*< 0.001*

*Adjusted for maternal age, BMI, infertility treatment, gestational weight gain, race/ethnicity, pre-pregnancy hypertension, prior preterm birth, payment source for delivery, smoking, education, nativity, parity, and W.I.C.