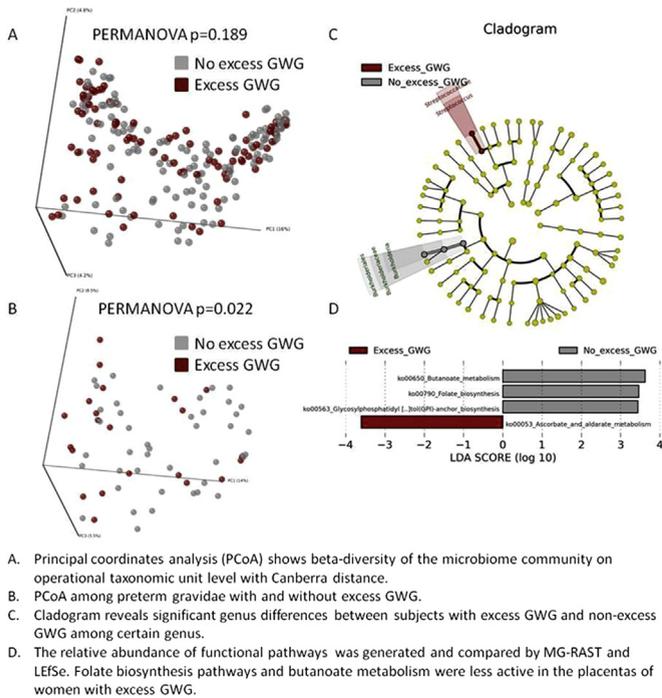


that were significantly differentially abundant among placentas from gravidae with excess GWG (1B.) This detailed analysis also uncovered significant differences in the metabolic function; excess GWG associated with decreased activity of placental microbial folate biosynthesis pathways and decreased butanoate metabolism (1C).

CONCLUSION: Overall, while there were no alterations in the microbiome by virtue of obesity, excess weight gain did alter the microbiome among those with preterm birth. Deeper metagenomic sequencing revealed excess GWG was associated with alterations in the abundance of certain genuses and functional pathways in the placental microbiome. Some of these pathways may affect the inflammatory milieu; for example, butanoate is posited to suppress colonic inflammation in the gut. We speculate that these alterations may contribute to increased morbidity among gravidae with excess gain.



70 The joint effects of pre-pregnancy body mass index (ppBMI) and gestational diabetes mellitus (GDM) on pregnancy outcomes and inpatient healthcare costs in Florida, 2004-2009

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OBJECTIVE: To examine the joint effects of maternal ppBMI and GDM on adverse pregnancy/ birth outcomes and hospitalization costs.

STUDY DESIGN: We conducted a retrospective cohort study using a linked maternal-infant database covering over 1.2 million infant born alive to Florida-resident mothers from 2004-09. Births were classified according to maternal ppBMI (underweight, normal, overweight, and obese classes I-III) and GDM status. Outcomes were identified using a combination of International Classification of Diseases, 9th Edition, codes in hospital discharge records and

indicators on the birth certificate. Using multivariable logistic regression, we compared the adjusted odds of each outcome across different levels of ppBMI and GDM. We also converted hospital charges into refined cost estimates and compared hospitalization costs among these groups. We excluded multiple births, infants with chromosomal anomalies, and mothers with pre-pregnancy diabetes.

RESULTS: Among 1,057,678 pregnancies 52,000 (4.9%) had GDM, 43.6% were either overweight or obese, and 3.3% were overweight/obese with GDM. GDM and ppBMI tended to have a synergistic effect on the odds of adverse birth outcomes (e.g., macrosomia, brachial plexus injury, congenital heart defect, hypoglycemia, shoulder dystocia [Table 1]), and maternal conditions (e.g., depression, eclampsia, gestational hypertension, sleep apnea, and delivery by cesarean section [Table 2]). Women with GDM and severe/morbid obesity experienced the highest rates of poor outcomes, which translated into significantly higher mean maternal (GDM/obese III: \$5614 vs. No GDM/normal BMI: \$4297) and infant (GDM/obese III: \$4393 vs. No GDM/normal BMI: \$3177) hospitalization costs.

CONCLUSION: Women with high ppBMI and GDM are at an increased risk of adverse birth outcomes. These findings suggest the importance of extensive BMI reduction interventions for those at risk of GDM.

Adjusted odds ratios* and 95% confidence intervals for the joint effect of gestational diabetes and pre-pregnancy body mass index (BMI), on selected fetal birth outcomes Florida, 2004-2009.

Groups	Infant birth outcomes							
	Macrosomia	LGA	PTB	BP injury	Congenital HD	Hypoglycemia	SIDM	Dystocia
Normal weight no GDM	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Normal weight with GDM	1.26(1.18-1.34)	1.47(1.39-1.56)	1.32(1.25-1.39)	2.99(2.06-4.33)	1.15(1.06-1.25)	0.76(0.66-0.88)	226.46(197.24-26.01)	1.36(1.19-1.55)
Underweight no GDM	0.51(0.48-0.53)	0.52(0.49-0.54)	1.35(1.31-1.39)	0.48(0.30-0.78)	1.05(1.00-1.11)	1.11(1.04-1.19)	0.58(0.34-0.99)	0.75(0.60-0.83)
Underweight with GDM	0.66(0.49-0.91)	0.81(0.61-1.06)	1.32(1.10-1.59)	2.66(0.66-10.72)	1.07(0.78-1.47)	0.51(0.26-0.98)	175.33(135.79-226.37)	1.58(1.10-2.46)
Overweight no GDM	1.54(1.51-1.57)	1.57(1.54-1.60)	0.98(0.96-0.99)	1.82(1.56-2.13)	1.07(1.04-1.10)	1.12(1.07-1.16)	2.02(1.68-2.42)	1.14(1.09-1.19)
Overweight with GDM	1.11(0.20-2.23)	2.46(2.34-2.59)	1.38(1.31-1.46)	3.21(2.20-4.67)	1.34(1.23-1.45)	1.06(0.93-1.21)	276.659(241.08-317.48)	1.71(1.56-2.00)
Obese class I no GDM	1.80(1.76-1.85)	1.90(1.85-1.94)	1.01(0.98-1.03)	2.03(1.67-2.46)	1.106(1.07-1.15)	1.29(1.23-1.36)	2.786(2.27-3.43)	1.14(1.07-1.21)
Obese class I with GDM	1.76(2.60-2.93)	3.36(3.19-3.55)	1.58(1.49-1.67)	5.91(4.23-8.26)	1.52(1.39-1.66)	1.20(1.03-1.38)	362.46(315.35-416.61)	1.61(1.38-1.88)
Obese class II no GDM	2.05(1.98-2.12)	2.19(2.12-2.26)	1.05(1.01-1.09)	2.54(1.98-3.25)	1.24(1.18-1.30)	1.45(1.36-1.55)	3.52(2.72-4.56)	1.06(0.97-1.16)
Obese class II with GDM	3.19(2.97-3.44)	4.02(3.76-4.30)	1.62(1.50-1.75)	5.19(3.26-8.27)	1.74(1.56-1.95)	1.34(1.11-1.61)	403.30(348.37-466.89)	1.58(1.29-1.93)
Obese class III no GDM	2.28(2.18-2.37)	2.47(2.38-2.57)	1.05(1.01-1.10)	2.62(1.95-3.54)	1.35(1.28-1.44)	1.74(1.61-1.87)	5.24(4.01-6.85)	1.08(0.97-1.21)
Obese class III with GDM	4.33(4.00-4.68)	5.12(4.76-5.51)	1.77(1.63-1.93)	6.90(4.33-10.99)	2.21(1.97-2.48)	1.92(1.61-2.30)	503.37(433.41-584.62)	1.60(1.27-2.01)

OR=odds ratio, CI=confidence interval, LGA=large for gestational age, PTB=preterm birth, BP injury=brachial plexus, HD=heart defect, SIDM=syndrome of infant born to diabetes mellitus mother.

*Adjusted for age, education, race, nativity, parity, infants gender, adequacy of antenatal care, smoking, alcohol, and drug use (No gestational diabetes, normal pre-pregnancy BMI is the reference group).

Table 2. Adjusted odds ratios* and 95% confidence intervals for the joint effect of gestational diabetes and pre-pregnancy body mass index (BMI), on selected maternal birth outcomes Florida, 2004-2009

Groups	Maternal birth outcomes							
	Depression	Eclampsia	All Eclampsia	Gen HPN	OSA	CS	Ref	Ref
Normal weight no GDM	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Normal weight with GDM	1.44(1.26-1.65)	1.10(0.79-1.53)	1.60(1.48-1.73)	1.68(1.59-1.79)	0.94(0.13-6.91)	1.37(1.33-1.41)	0.94(0.13-6.91)	1.37(1.33-1.41)
Underweight no GDM	1.08(1.00-1.18)	0.92(0.76-1.12)	0.81(0.76-0.86)	0.74(0.70-0.77)	0.38(0.05-2.82)	0.78(0.77-0.80)	0.38(0.05-2.82)	0.78(0.77-0.80)
Underweight with GDM	1.17(0.70-1.95)	0.81(0.20-3.24)	1.86(0.76-4.48)	0.99(0.76-1.29)	0.97(0.86-1.10)	0.97(0.86-1.10)	0.97(0.86-1.10)	0.97(0.86-1.10)
Overweight no GDM	1.16(1.11-1.22)	1.43(1.30-1.57)	1.51(1.47-1.55)	1.69(1.65-1.72)	3.04(1.86-4.95)	1.35(1.34-1.37)	3.04(1.86-4.95)	1.35(1.34-1.37)
Overweight with GDM	1.52(1.32-1.76)	1.91(1.46-2.50)	2.58(2.40-2.76)	2.87(2.72-3.03)	9.93(4.67-21.13)	1.80(1.74-1.86)	9.93(4.67-21.13)	1.80(1.74-1.86)
Obese class I no GDM	1.27(1.19-1.35)	1.78(1.58-1.99)	2.00(1.94-2.07)	2.33(2.27-2.38)	8.49(5.33-13.55)	1.71(1.71-1.75)	8.49(5.33-13.55)	1.71(1.71-1.75)
Obese class I with GDM	1.58(1.34-1.86)	2.53(1.91-3.33)	3.28(3.04-3.53)	3.75(3.54-3.97)	16.83(8.34-33.96)	2.58(2.59-2.48)	16.83(8.34-33.96)	2.58(2.59-2.48)
Obese class II no GDM	1.52(1.40-1.65)	2.13(1.83-2.47)	2.45(2.35-2.55)	2.95(2.86-3.04)	12.17(7.24-20.47)	2.16(2.11-2.20)	12.17(7.24-20.47)	2.16(2.11-2.20)
Obese class II with GDM	1.97(1.63-2.37)	3.31(2.31-4.44)	3.89(3.55-4.26)	4.56(4.23-4.89)	29.51(14.61-59.61)	2.98(2.83-3.15)	29.51(14.61-59.61)	2.98(2.83-3.15)
Obese class III no GDM	1.65(1.49-1.82)	2.72(2.30-3.21)	2.90(2.77-3.05)	3.68(3.55-3.82)	69.29(45.26-106.08)	2.84(2.77-2.91)	69.29(45.26-106.08)	2.84(2.77-2.91)
Obese class III with GDM	2.00(1.62-2.46)	3.12(2.16-4.54)	4.60(4.17-5.07)	5.41(5.01-5.84)	97.23(56.98-163.92)	4.30(3.99-4.48)	97.23(56.98-163.92)	4.30(3.99-4.48)

OR=odds ratio, CI=confidence interval, LGA=large for gestational age, PTB=preterm birth, BP injury=brachial plexus, HD=heart defect, SIDM=syndrome of infant born to diabetes mellitus mother

*Adjusted for age, education, race, nativity, parity, infants gender, adequacy of antenatal care, smoking, alcohol, and drug use (No gestational diabetes, normal pre-pregnancy BMI is the reference group)