

Do Maternal Dietary Carotenoids Modify the Relationship Between Pre-Pregnancy BMI and Pregnancy Outcomes? Findings From An Exploratory Analysis

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Objectives: Previous studies show that pre-pregnancy BMI (pBMI) is an independent determinant for pregnancy outcomes, but less is known about what mediates this relationship. Carotenoids are dietary antioxidants that may be able to attenuate inflammation and oxidative stress generated by maternal obesity. The objective of this study is to determine whether carotenoid levels have the potential to modify the relationship between pBMI pregnancy outcomes in a cohort of mothers who delivered at a Midwestern academic medical center.

Methods: Following IRB approval, maternal and cord blood samples were collected in mother-infant pairs. Serum nutrient levels were measured using High Performance Liquid Chromatography. Maternal serum carotenoids (including lutein + zeaxanthin, beta-cryptoxanthin, total lycopene, alpha-carotene, total beta-carotene, and retinol) and

pBMI data were available for 229 mothers. BMIs recorded up to 10 weeks into pregnancy were considered pBMI. Logistic regression models assessed relationships between pBMI and binary pregnancy outcomes (caesarian section (CS), preeclampsia, and gestational diabetes). Initial models were adjusted for infant gestational age (GA). Subsequent models adjusted for levels of pro-vitamin A (retinol) and non-provitamin A (lutein + zeaxanthin) carotenoids. A p-value of < 0.05 was considered statistically significant.

Results: Preceding pregnancy, 1.3% ($n = 3$), 40.2% ($n = 92$), 27.5% ($n = 63$), and 31.0% ($n = 71$) of the mothers were underweight, normal weight, overweight, and obese, respectively. In the models adjusted for GA, pBMI was associated with higher risk of CS (odds ratio [OR] 1.06, $p = 0.01$), preeclampsia (OR 1.07, $p < 0.001$) and gestational diabetes (OR 1.10, $p = 0.007$). In two separate models, one adjusting for retinol levels and one for non-provitamin A carotenoid levels, associations with preeclampsia were no longer significant. Associations with CS and gestational diabetes remained significant after adjustment.

Conclusions: In this population, there was evidence of maternal carotenoid levels modifying the relationship between pBMI and preeclampsia. Future studies should further explore the ability of carotenoids to influence pregnancy outcomes.

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