Organophosphate pesticide exposure during pregnancy, gestational weight gain and long-term postpartum weight retention

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OBJECTIVES/SPECIFIC AIMS: Little is known about potentially obesogenic endocrine-disruptors’ effects on excessive gestational weight gain (GWG) and postpartum weight retention (PPWR), which increase risk of adverse pregnancy and postnatal outcomes. We explored associations between prenatal organophosphate (OP) pesticide exposure and increased weight both during and after pregnancy. METHODS/STUDY POPULATION: Three dimethyl (DM) and three diethyl (DE) OP metabolites were measured in spot urine samples collected at <18, 18-25, and >25 gestational weeks among 688 participants in the Generation R Study. Metabolite levels were expressed as molar concentration/gram creatinine and log10-transformed. GWG and PPWR were calculated as the difference between weight at each prenatal/postnatal visit or maximum gestational weight and pre-pregnancy weight. In covariate-adjusted regression models we assessed associations of metabolite concentrations at each prenatal visit and, where appropriate, averaged across pregnancy with early-to-mid pregnancy, mid-to-late pregnancy, late pregnancy-to-maximum, and total GWG; insufficient and excessive GWG according to Institute of Medicine guidelines; and long-term PPWR at 6 and 10 years postpartum. Based on OP pesticides’ lipophilicity and association with hypomethylation, we investigated interactions with pre-pregnancy body mass index, periconceptional folic acid supplementation, and breastfeeding duration. RESULTS/ANTICIPATED RESULTS: A 10-fold increase in late pregnancy DE metabolite concentration was associated with 1.34 kg [95% confidence interval: 0.55, 2.12] higher late pregnancy-to-maximum GWG. A 10-fold increase in mean DE metabolite concentration across pregnancy was associated with 2.41 kg [0.62, 4.20] lower PPWR at 6 years. Stratified analysis suggested that the prenatal finding was driven by women with pre-pregnancy BMI ≥25 kg/m2, while the postnatal finding was driven by women with pre-pregnancy BMI <25 kg/m2 and with inadequate folic acid supplementation. We found no associations between OP pesticide metabolites and insufficient or excessive weight gain and no interaction with breastfeeding. DISCUSSION/SIGNIFICANCE OF IMPACT: In this longitudinal analysis, we observed a positive association of OP pesticide metabolites with GWG in late pregnancy among overweight/obese women, potentially reflecting inhibition of OP pesticide detoxification by oxidative stress. Postnatally, under/normal weight women with higher OP pesticide metabolites had lower PPWR, possibly due to better metabolic function and a more healthful diet. These results suggest that there may be a critical period during the late phase of pregnancy when OP pesticide exposure may increase GWG, and this association may be amplified in overweight/obese women. Areas for future research include examination of how the interaction between OP pesticides and polymorphisms of the paraoxonase (PON1) gene, which detoxifies OP pesticides, affect GWG/PPWR; exploration of the interplay among maternal pre-pregnancy BMI, oxidative stress, and PON1 levels; and characterization of the variability of OP pesticides exposure across pregnancy using more frequent repeated urine samples.