

RELATIONSHIPS BETWEEN LEAD EXPOSURE AND MATERNAL CORTISOL CONCENTRATIONS DURING PREGNANCY

Joe M. Braun, *Department of Environmental Health, Harvard School of Public Health*

Robert O. Wright, *Department of Environmental Health, Harvard School of Public Health*

Adriana Mercado-García, *Center for Population Health Research, National Institute of Public Health, Mexico*

Lourdes Schnaas, *Division of Research on Public Health, National Institute of Perinatology, Mexico*

Howard Hu, *Department of Environmental Health, University of Michigan*

Rosalind Wright, *Department of Environmental Health, Harvard School of Public Health*

Martha María Téllez-Rojo, *Center for Population Health Research, National Institute of Public Health, Mexico*

Background and Aims: Gestational lead (Pb) exposure and stress may increase the risk of adverse maternal, neonatal, and childhood health outcomes. Some studies suggest that Pb may alter hypothalamic-pituitary-adrenal (HPA)-axis function. Correlates of psychological stress, like depression, may modify the effect of Pb exposure, increasing susceptibility to Pb-induced HPA-axis dysregulation. We examined the relationship between Pb exposure and HPA-axis function in a cohort of 850 pregnant women from Mexico City.

Methods: Blood Pb concentrations were measured during the second trimester. Tibia and patella bone Pb concentrations were measured 1-month postpartum and represented cumulative Pb exposures. Second trimester salivary cortisol concentrations were measured in 10-timed saliva samples collected over 2-days and used to characterize diurnal HPA-axis function. Cortisol concentrations were parameterized as the area-under-the-curve, morning rise slope, and diurnal slope. Maternal depressive symptoms were examined as a modifier of Pb-cortisol relationships, measured with the Edinburgh Postnatal Depression Scale (EPDS), and dichotomized as ≥ 13 / < 13). Linear mixed-effect models were used to account for repeated measurements.

Results: Median blood, tibia, and patella Pb concentrations were 3.3 $\mu\text{g/dL}$, 3.6 $\mu\text{g/g}$ and 3.1 $\mu\text{g/g}$, respectively. After adjustment for confounders, parameter estimates between patella and blood Pb biomarkers and cortisol parameters were null in value. However, each 10 $\mu\text{g/g}$ increase in tibia Pb concentrations was associated with a 20% increase (95% confidence interval [CI]: -7%, 55%) in morning rise slopes. This effect was greater among women with EPDS scores ≥ 13 (76%; 95% CI: 13%, 175%, interaction p-value < 0.05).

Conclusions: These results suggest that tibia, but not blood or patella Pb concentrations might be associated with some aspects of HPA-axis function during pregnancy. We observed evidence that depressive symptoms modify the associations between tibia Pb concentrations and maternal cortisol rhythms. Future studies should validate these findings and determine the clinical significance of altered maternal cortisol profiles in pregnancy on child development.