

PRENATAL EXPOSURE TO MULTIPLE HEAVY METALS AND NEONATAL NEUROBEHAVIORAL DEVELOPMENT IN SHANGHAI, CHINA

XiaoDan Yu, *Shanghai Key Lab of Children's Environmental Health, Shanghai Institute for Pediatric Research, XinHua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200092, China.*

ChongHuai Yan, *Shanghai Key Lab of Children's Environmental Health, Shanghai Institute for Pediatric Research, XinHua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200092, China.*

XiaoMing Shen, *Shanghai Key Lab of Children's Environmental Health, Shanghai Institute for Pediatric Research, XinHua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200092, China.*

Ying Tian, *Shanghai Key Lab of Children's Environmental Health, Shanghai Institute for Pediatric Research, XinHua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200092, China.*

LuLu Cao, *Shanghai Key Lab of Children's Environmental Health, Shanghai Institute for Pediatric Research, XinHua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200092, China.*

XiaoGang Yu, *Shanghai Key Lab of Children's Environmental Health, Shanghai Institute for Pediatric Research, XinHua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200092, China.*

Li Zhao, JunXia Liu, *Shanghai Key Lab of Children's Environmental Health, Shanghai Institute for Pediatric Research, XinHua Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai 200092, China.*

Background: Epidemiological studies examining the effects of prenatal heavy metals exposure on neonatal development at the population-based level are limited.

Objective: To explore prenatal exposure levels to heavy metals and examine whether exposure is associated with neonatal development.

Methods: A stratified multi-stage cluster sampling methodology was used to investigate 1652 mother-infant pairs from 2008 through 2009 in Shanghai. Cord blood concentrations of Pb, Hg, Mn, Cd, As, Tl and NBNA (Neonatal Behavioral Neurological Assessments) were tested. We defined three different exposure levels (low, medium and high) according to the normal range values.

Results: The median blood Pb, Hg, Mn, Cd, As and Tl concentrations were 41• g/L, 1.88• g/L, 4.1• g/L, 0.03• g/L, 0.86• g/L and 0.02• g/L, respectively, which all were in the normal range. Increasing exposure to Cd, Hg, Mn, As and Tl during pregnancy was associated with decreasing NBNA scores. High level-exposure (exceeding the normal range) of Hg, Mn, Cd and Tl had lower NBNA scores compared to medium and low levels (both in the normal range), which implied that the normal range of these heavy metals was safe for the newborns' development. The mean decreasing scores of NBNA was 0.61, 1.24, 1.50 and 0.84 (total score = 40) with high-level exposure of Hg, Mn, Cd and Tl, respectively. The medium-level exposure (in the range of normal) to As had lower NBNA scores compared to low-level exposure, which implied that the normal range of As was not safe to the newborns' development. However, prenatal Pb high-exposure did not affect NBNA scores either by single or multiple factor analysis. In addition, important contribution factors for heavy metals pollutants were diet, lifestyle and housing renovation.

Conclusions: prenatal heavy metals except Pb exposures were associated with NBNA. The adverse effect of medium-level As warrants the need to further investigate the safe range of As.