Blood lead, iron deficiency and attentional ADHD symptoms in Uruguayan first-graders

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Abstract

The combined effect of iron deficiency and lead exposure on attentional ADHD symptoms is not well studied. We investigated the associations among blood lead level (BLL), iron deficiency (ID, serum ferritin <15 μg/L) and inattention/cognitive problems (I/CP-measured by the Conners Teacher Rating Scale) in a cross-sectional study of first-grade children (n=257, age 6.7±0.5 years, 55.6% boys) from Montevideo, Uruguay. Aspects of children’s attention (ex., attention shifting) were measured by teacher reports on the BRIEF questionnaire. Generalized linear models (GLM) accounting for the school-based cluster design and adjusting for maternal education and employment, parental smoking, household crowding and SES, as well as child’s general intelligence and attention problems, were used to model the association of BLL and ID with I/CP scores. Mean of BLL was 4.19±2.2 μg/dL, 39% of children had ID and 25% had mild to severe inattention problems (I/CP > 60 T score). BLL and serum ferritin were not independently associated with I/CP. However, in children with ID, BLL was associated with more problematic I/CP scores (0.32±0.14, p=0.026). This was not observed among non-ID children (0.09 ±0.08, p=0.239). General intelligence and maternal education were protective factors against I/CP (both at p<0.000). The ability to shift attention, commonly beneficial for cognitive performance, was negatively associated with I/CP in children with ID, presumably by ID’s negative effect on the ability to control the attentional focus. In sum, our early findings suggest an adverse effect of the combination of ID and higher BLLs on sustained attention, a key competence for learning and socialization.