

Evidence synthesis on childhood chromium level among normal and cognitive defect children

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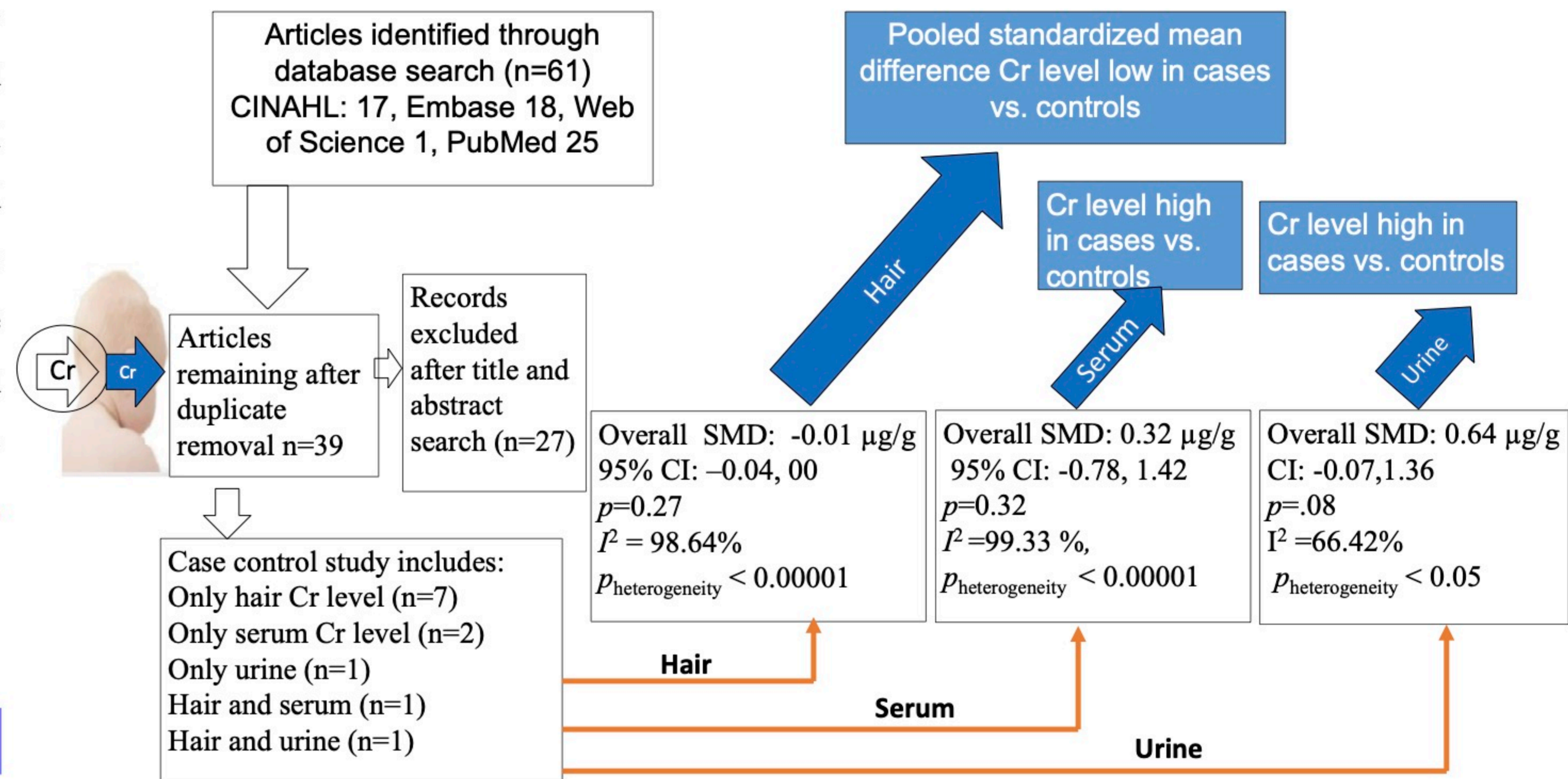
Introduction

Globally, millions of children have never had an opportunity to reach their full **neurodevelopmental potential** due to metal and trace element exposures during pregnancy and childhood. Several **biomarkers** have been suggested to be useful for diagnosis and monitoring of children's neuropsychological development and its association with exposure to heavy metal and trace element. The molecular mechanism through which Cr might affect child development is poorly understood. In this study we aimed to evidence synthesis on childhood chromium **level in hair, serum, and urine** among normal and cognitive defect children.

Methodology

We conducted a **systematic literature review and meta-analysis** using PubMed, Embase, Web of Science and CINAHL databases. To compare hair, urine and serum Cr levels in children with cognitive defect vs. healthy control children, we performed a **random effect meta-analysis** using **standardized mean difference (SMDs)** and 95% confidence intervals (CIs). Using Q and I^2 statistics the heterogeneity among the studies was assessed. In this meta-analysis, we consider heterogenous for $p < 0.10$ or $I^2 > 50\%$ and p -value (2 sided) < 0.05 was statistically significant.

Results



- The pooled **standard mean differences (SMD)** showed that **hair Cr levels** were non-significantly **lower among children with cognitive defects** ($-0.01 \mu\text{g/g}$, 95% CI: $-0.04, 00$, $p=0.27$).
- In **serum and urine**, the pooled SMD was higher in case compared with control children ($0.32 \mu\text{g/g}$, 95% CI: $-0.78, 1.42$, $p=0.56$ and $0.64 \mu\text{g/g}$, CI: $-0.07, 1.36$, $p=0.08$; respectively).

Conclusions

This systematic review found **no significant differences in hair, serum and urine Cr levels** between case and healthy control children. Larger studies using standardized criteria and longitudinal assessment of cognitive development are needed to determine whether there is a dose response effect of childhood Cr exposure on cognitive function of children