Summary and Critical Appraisal:

Choi et al., 2014. Associations of lifetime exposure to fluoride and cognitive functions in Chinese children: A pilot study.¹

a) Critical Appraisal – Using 11 questions to help you make sense of descriptive/cross-sectional studies³

- Poor quality cross-sectional pilot study. Limitations are:
  - Unclear recruitment strategy of study sample;
  - Small sample size (n=51);
  - Power calculation was not provided;
  - Data analyst was not blinded; and
  - Unclear if instruments used to measure cognitive function were validated;

  • For some measurements, only subsets of the instrument were used.

b) Key Findings (as reported in the study)

- A pilot study was conducted among 51 first grade Chinese children to assess the association between lifetime natural fluoride exposure and cognitive functions.
- Three types of fluoride exposure were measured: fluoride in urine; fluoride in drinking water; and fluorosis (i.e., very mild/mild moderate/severe). Cognitive functions were assessed using twelve various tests.
- Results reported that children with moderate and severe dental fluorosis scored significantly lower in a working memory test (Wechsler Intelligence Scale for Children-Revised (WISC-R) - Digit Span test) than those with normal or questionable fluorosis (total score difference: -4.28 {95% confidence interval, -8.22 to -0.33}). Other cognitive tests did not show an association with fluoride exposure.

c) Limitations/Considerations

- Results are based on a small pilot sample of children exposed to high natural fluoride (> 1 to 5.84 mg/l).
- The authors only used one (Digit Span test) out of two (Letter-Number Sequencing) core tests from the WISC-R to assess working memory. For an accurate assessment, it is recommended that the two core tests be used together.²
- This unbalanced assessment may explain why the study reported a statistically significant association, as only one out of 12 cognitive function tests showed an association with one of three types of fluoride exposure.

d) Final Summary Analysis

- The quality of the evidence is poor with important methodological limitations, and should be interpreted with caution.
- The evidence provided is not relevant to community water fluoridation, and does not support a link between optimal fluoride consumption (0.7 mg/L) and cognitive function in children.
References

