Study: Fluoride intake has no ill effect on adolescents' bones

By Rob Goszkowski, Associate Editor

February 3, 2014 -- Decades of research and approval from a litany of health organizations have not quieted the debate about fluoride's benefits, which some question -- or dispelled claims about the harm it may cause. Its impact on bone is a natural area of concern, given that 99% the body's fluoride is bound in calcified tissue, noted the authors of a new report in the *Journal of Dental Research* (January 27, 2014).

Consequently, they sought to explore the potential impact of fluoridated water on bone in young people who consume it in a prospective cohort study. The researchers from the Colleges of Dentistry, Public Health, Pediatrics, Health and Physiology, Liberal Arts, and the Institute for Clinical and Translational Sciences at the University of Iowa in Iowa City ultimately found that typical amounts of fluoridation had no effect on bone mineral measurements of adolescents living in areas with fluoridated water.

Interestingly, the nearby city of Des Moines recently decided to continue its 54-year practice of water fluoridation, and the city water department received more than 650 comments from customers on the matter.

The results of the study, which included a group of 15-year-old children who grew up drinking fluoridated water, "showed that the proportions of variance in mineral content or density of lumbar spine, proximal femur, and whole-body skeleton (without head) explained by lifelong fluoride intake were very small (consistently ≤ 3%) at the daily intake range considered in this investigation," the researchers explained.

Conflicted conclusions have surfaced in previous studies exploring the link between bone and fluoridated water consumption in adults and seniors. But few studies have considered the effect of fluoride in levels found in U.S. drinking water on the bones of children. More importantly, previous research has found that fluoride is capable of accumulating more quickly in the bone structure of children than adults.

"It is plausible that fluoride's effects on developing bone could be significant," the researchers explained. "Thus, it is essential that the relationship between fluoride intake and bone development in children be thoroughly investigated."

They sourced their data from the longitudinal Iowa Fluoride Study (IFS)/Iowa Bone Development Study (BDS), which included newborns from eight hospitals in the state from 1992 through 1995. There were 1,382 infants that stayed in the IFS study through their first six months of life. Roughly 800 still were still participating from 1998 through 2000, when 630 of them were included in the BDS study. These participants had received at least one bone densitometry assessment. Of them, 415 had a bone scan at age 15, while accelerometry data were available for 358 of them.

The duel-energy x-ray absorptiometry scans were performed with a densitometer on these participants, giving researchers an opportunity to assess several pieces of bone mineral content data for the entire body (except for the head), left proximal femur (hip), and anteroposterior lumbar spine, as well as bone mineral density for the left hip and anteroposterior lumbar spine. The researchers explained that they wanted to cover their bases in terms of observing the effect of fluoridated water on different types of bone at different sites. Participants were also asked if they had broken a bone within a year or so of the densitometry.

Next, the researchers estimated the participants' cumulative fluoride intake. This was done in part with a questionnaire answered by parents, which helped the researchers to estimate cumulative daily fluoride intake for three time points up to the child's first year, one time point every other year until age 11, one additional time point until age 15, and one close to the age of 15. The researchers also factored in height and weight, physical activity, and dietary intake of calcium.

Gender was stratified during the statistical analysis to account for different rates of growth and other studies that suggested differing effects of fluoride.

"With adjustments for height, weight, time since PHV [peak height velocity], and Tanner stage, none of the associations of daily fluoride intake from birth to age 15 years with bone densitometry outcomes was statistically significant," the researchers wrote.

They attributed a 2% or less variance to fluoride intake for both girls and boys, and allowed that certain nonsignificant associations were positive while others were negative.

But even during the rapid bone growth that takes place during puberty, the researchers determined that the relationship between bone outcome measures and fluoride intake was weak. It was insignificant after adjustment for other variables as well, they concluded.

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