

Water Fluoridation and Dental Caries in U.S. Children and Adolescents – Dr. Gary Slade

Chiraz: A very recent article published in the Journal of Dental Research investigated the dental health benefits of community water fluoridation.

We have invited Dr. Gary Slade, corresponding author of the article to tell us about the study he undertook with his colleagues. Dr. Slade is the John W. Stamm Distinguished Professor and Director of the Department of Dental Ecology at the University of North Carolina at Chapel Hill.

Dr. Slade, it is a pleasure to meet you, welcome to this Oasis Conversation.

Dr. Slade: Good morning.

Chiraz: So, I really have three main questions that will give us a little bit of information about the article that you co-authored. Why did you undertake this study?

Dr. Slade: Well, we really wanted to check dental health and fluoride and get an update on where there really are dental health benefits of water fluoridation still in this day and age.

Chiraz: And what did you find out?

Dr. Slade: Well, yes, we did find that it is beneficial. So, children and adolescents who live in parts of the United States that are mostly fluoridated, have less dental decay than children living in other areas where there's very little fluoridation. The details behind that are: we figured out the amount of fluoridation in each county in the United States; there is about 3000 of them, based on information from the Centers for Disease Control and Prevention. They maintain a database of fluoride content in drinking water in each county and also the population size of each county. So, we basically classified counties as being relatively high amount of fluoridation if there were at least 75% of people in that county with fluoridated public water serving their household. So, counties that had less than 75% population coverage, we stated a relatively low fluoride coverage.

Dr. Slade: So, those were the sort of comparison we did. And then, we looked at dental decay levels both in the primary dentition and in the permanent dentition of children as young as 2 years and as old as 17 years of age. We found in the primary dentition there was about 30% percent less decay. So, the average number of decayed or filled tooth surfaces was about 30% less in the predominantly fluoridated counties compared to children living in less fluoridated counties. That's quite a big difference. In the permanent dentition, we found a smaller percent difference, but it was still statistically significant. It was 12% less [inaudible] and fewer decayed, missing or filled permanent tooth surfaces in the predominantly fluoridated counties.

Chiraz: Why do you think there is a difference in percentage between the primary and permanent teeth?

Dr. Slade: This is something that's been reported in many other studies done in other countries. This is actually the first time, using national data in the United States, that this difference has been noted. So, I think this really is one of the more important results from our study that hasn't previously been done at a national level, showing that fluoridation or at least living in a fluoridated area is associated with quite a good deal of greater benefits in the primary teeth than the permanent teeth. So, why might that be? Possibly, it's all about the overall rate at which decay happens and these 2 to 8-year old children's primary teeth are only built to last for about 10 years. So, the decay that's happening happens fairly rapidly in primary teeth and also clinically, we see decay progress very quickly in much thinner enamel; the pits and fissures and more precarious in primary teeth.

Dr. Slade: We know clinically that decay progresses very rapidly in the primary teeth. So, I think even in these young kids because of that rapid progress of decay, I think there's a bigger chance to see a difference. It's just that there's more of a signal of the disease happening in the primary teeth. Then is the case in the permanent teeth where decay in these kids' permanent teeth still does progress, but it's not as rapid. And so, the net result is that there perhaps hasn't been as much disease happen already in these children and adolescents in their permanent teeth. So, fluoride hasn't yet had a chance to have a visible lower statistically significant impact. So, that's probably a principal reason. There could be other reasons that relate more to just this stage in life that prevention really has the biggest bang for the buck; and we see this in many other areas in epidemiology where it's very early influences that often stick and carry with children and this sometimes even begins in utero.

Dr. Slade: And maybe there's something of that going on here that we're seeing in the earliest stages of life; exposure to this prevention is having a much greater influence than perhaps some of the children and adolescents. As they're getting older, there are other factors that are now influencing their health and their dental health. So, there's also some possible underlying difference in the biologic processes, aging, and developmental stages where prevention is having a bigger effect earlier in life.

Chiraz: In the article, there's a sentence that caught my eye reads that reads: "As impressive as these figures appear, the potential of expanding community water fluoridation is limited." What are the policy as well as the clinical implications of your study?

Dr. Slade: So, firstly, if we simply said, well, okay, there's about 100 million Americans living in places that don't have fluoride in the drinking water that's in a population; so, it's about one third of the population doesn't have fluoride in the drinking water. So, we did some calculations and this is a population-based study, so we said, well, if these population-based benefits were to be extended to those other hundred million people, which would represent about 5 million of them would be children that would equate to about more than 6 million fewer primary tooth surfaces with decay and just over a million permanent tooth surfaces in these children and adolescents. So, you know, If we could

switch on a tap and suddenly fluoridate the 100 million Americans who are not getting fluoride, we'd see literally millions of fewer cavities develop.

Dr. Slade: Having said that, that's easier to say, let's switch on a tap. The real problem we're confronting here is that many of these places without fluoride in the drinking water probably will mitigate it. For one thing, there's about 30 million Americans who don't actually have public water supply in the house. They have well water and other things like that. Most of the well water does not have fluoride in it. But then there's another 70 million or so whose public water system comes to the house, but it's a system that is in a fairly small population or there might be engineering challenges, making it difficult to fluoridate the water. But another real-life problem is even in fairly larger places, it would be very sensible to fluoridate the public water system; there is very severe opposition, a vocal opposition in the ballot booths when there's local referendums as to whether the place should fluoridate or not. And, we've seen that recently in Portland, Oregon, where a vote to fluoridate the water-that's a big city you know-the water fluoridation was knocked down. So, it's simple to say, let's turn on the tap and fluoridate more public water systems, but the simple fact is a lot of these places are possibly never going to get fluoride through the water supply. So, you know, public health has got a bit of a challenge here on what to do instead, if it's not going to come through the taps and through the pot, how can we get fluoride in the drinking water?

Chiraz: Perfect. Thank you so much Dr. Slade for taking the time to speak with me today. Good luck in your endeavors and I hope to host you again on oasis.

Dr. Slade: Okay. Thank you very much.