There are many studies found in the international literature documenting that an increase in dental fluorosis leads to an increase in tooth decay (caries) - the very thing it (fluoride) is proclaimed to prevent.

While at one point it was believed that very mild and mild DF was associated with a decrease in caries in younger children, new evidence shows that the same forms of DF actually cause an increase in both caries occurrence AND intensity as the child gets older.

A short list of 30 studies is provided below, arranged in alphabetical order.

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"Dental fluorosis is a defect in the formation of the enamel by high fluoride concentrations during tooth development. It produces hypomineralization of the enamel by increasing the porosity, thus exposing the tooth to decay....The severity was mild and very mild in 90 % of cases. Tooth decay appeared in 55 % of children with fluorosis and in 43 % of children without fluorosis,...The prevalence of dental fluorosis is rapidly increasing. Tooth decay affected more often children with fluorosis."


"Logistic regression analyses indicated that subjects in the high-F and urban Arusha municipality were at a significantly higher risk of dental caries than children in the low-F areas."

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While only 54.4% of those without fluorosis had caries, 80% of those with fluorosis had caries.

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Birkeland JM, Ibrahim YE, Ghandour IA, Haugejorden O - "Severity of dental
"Children . . . drinking water with 1.0-2.0 mg fluoride/L (median = 1.8), had significantly higher caries prevalence (21% versus 8%) than in a 0.4 mg fluoride area."

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"In this study, DT (Decayed Permanent Teeth) increased with an increase in the fluoride content."

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Carlsson A - "Current problems relating to the pharmacology and toxicology of fluorides" Lakartidningen 75: 1388-1392 (1978)

"More severe degrees of enamel fluorosis are associated with an abnormally high incidence of caries... There is thus no doubt that a high degree of enamel fluorosis causes an increased tendency to caries."

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"When the non-fluorosis group was compared to the fluorosis group, there was a significant difference in caries experience; the fluorosis group having higher DMFT and dft... It appears that with increased severity of fluorosis there is increased susceptibility for dental caries."

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"The children in the high-fluoride area who had dental fluorosis at or above a TF score of 3 had higher levels of dental caries than those with milder degrees of fluorosis present. This finding suggests that if fluoride intake is too high, severe enamel hypomineralization may result in increased caries risk."

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Cunha-Cruz J, Nadanovsky P - "Dental fluorosis increases caries risk" Journal of Evidence Based Dental Practice 5: 170-171 (2005)

"The reviewed study suggests an increased risk of caries among children with fluorosis. The results are reinforced by the observed dose-response relationship: the higher the fluorosis, the higher the
caries prevalence. However this was not a linear relationship; the threshold at which fluorosis appears to start increasing the risk of caries was at TF score 3."


"Children with severe fluorosis have a significantly higher caries experience than do children with lesser degrees of fluorosis."


"Both the caries prevalence and the mean caries experience were significantly higher in children with diffuse opacities (dental fluorosis) than in those without..."


"...individual level fluorosis scores when dichotomized as 0-2 as the referent level to level 3-4 demonstrated a statistical significant higher DMFS with the higher fluorosis level."


"The highest DMFS values could be related to fluorosis Grade 3 and 4..."


"Fluorosis at moderate and severe levels was associated with a higher prevalence of dental caries."


"Very interestingly and in agreement with Retief et al. [1979a] and Schamschula et al. [1979], a significant (p < 0.02) positive
association was found between the caries experience (DMFS) and the enamel fluoride level of children from the high fluoride area (3.70).”


"Significantly (P < 0.01) more children had decayed teeth in the high F area than in the other two areas. The results suggest a positive association between high F levels in the drinking water and dental caries."


"A positive association between dental caries and enamel defects (hypoplasia, demarcated opacity and dental fluorosis) was observed for schoolchildren aged 5...The results of this study indicated that children had increased odds of dental caries when enamel defect was present, both in deciduous and permanent dentition..."


"With the severity of dental fluorosis, caries prevalence is rising. Reducing the incidence of dental fluorosis should become an important measure to prevent dental caries."

Ibrahim YE, Bjorvatn K, Birkeland JM - "Caries and dental fluorosis in a 0.25 and a 2.5 ppm fluoride area in the Sudan" Int J Paediatr Dent 7(3):161-6 (1997)

"Analyses based on children in the 2.5 ppm area alone, showed significantly higher DMFT (Decayed, Missing, and Filled Teeth) by increased severity of dental fluorosis."


"The WHO/FAO/UNICEF study (Bohdal, Gibbs and Simmons 1968) in which some 19,000 individuals were examined, a strong positive relationship between the presence of fluorosis and the occurrence of dental caries were reported, though the degree of severity of fluorosis was found not to be associated with the incidence of
caries."

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"The decay rate in the permanent dentition gradually increased with increasing fluorosis severity..."

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"A statistically significant positive association was found between caries prevalence and fluorosis; the more caries experienced, the more severe the fluorosis level. Boys experienced significantly higher fluorosis levels than girls."

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"The prevalence of caries increased as the degree of fluorosis increased. The mean DMFT was 0.43 in children showing no fluorosis but increased up to 1.65 in children showing a fluorosis score of 3."

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Olsson B - "Dental findings in high-fluoride areas in Ethiopia" Community Dent Oral Epidemiol 7(1):51-6 (1979)

"Teeth with moderate and severe fluorosis more frequently had dental caries than teeth with no or very mild and mild fluorosis.... Gingivitis was seen in 97% of the children..."

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"Finally, an association of severity of dental fluorosis and caries severity was observed. While fluorosis was very common, it was often mild or very mild...The results showed that children with dental fluorosis have higher severity of caries (DMFT ≥ 4)."

"When we compared high-severity caries group (DMFT ≥ 4 as cutoff point), we observed higher caries severity in children with fluorosis (9.6 percent in very mild/mild, and 10.6 percent in moderate/severe) than children without fluorosis (7.8 percent)."
Additionally, compared only DMFT=0 versus DMFT ≥ 4 similar results were observed; prevalence of DMFT ≥ 4 in fluorosis-free children was 13.5, while 15.5 and 17.1 was observed in children with very mild/mild and moderate/severe fluorosis.


Increased DMFT with increasing rate of dental fluorosis.

Retief DH, Bradley EL, Barbakow FH, Friedman M, Van der Merwe EHM, Bischoff JI - "Relationships among fluoride concentration in enamel, degree of fluorosis and caries incidence in a community residing in a high fluoride area" Journal of Oral Pathology 8:224-236 (1979)


"The DMFT increased as the severity of fluorosis increased from grade 1 to grade 2". (Dean Index: "questionable" to "mild")


Moderate and severe fluorosis cause more caries and caries severity.


"Independent of the fluoride concentration in drinking water, caries prevalence increased consistently with increasing severity of dental fluorosis in the second molars, first molars, premolars and canines."


"Children with developmental defects of dental enamel had a significantly higher incidence of caries and elevated mean DMF, as compared to children without any abnormalities of mineralization."

SEE ALSO:
"Our findings indicate that dental caries was caused by high fluoride and low dietary calcium intakes, separately and through their interactions. Dental caries was most severe and complex in calcium-deficient children exposed to high intakes of endemic fluoride in drinking water."

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In Vitro:


"...mild and moderately fluorosed dentine was significantly caries susceptible in vitro."

See also:

Cheono D, Johansen E - "Caries in rats receiving systemically administrated fluoride during tooth development"/ JADR Meeting 1971 Abstract No 783, p. 248

NOTE: The statement that fluoride reduces caries by being incorporated into the enamel, thus "making the tooth stronger", is entirely wrong.

The fluoride content of the enamel is increased with increasing severity of fluorosis (Richards et al, 1989).

The more severe the fluorosis - the more caries can be expected.


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Other recent studies involving topical applications:


SEE ALSO: DF = Increase in Caries