



SCIENTIFIC BACKGROUND

Fluoridated salt

A cost-effective way to prevent dental caries at community level



The smarter salt

Fluoridated salt is the single most inexpensive, effective and safe measure to prevent tooth decay in entire populations.

Fluoride is a natural mineral found throughout the earth's crust and widely distributed in nature. Some foods and water supplies contain fluoride.

The use of fluoride strengthens tooth enamel and reduces the harmful effects of plaque. Fluoride also makes the entire tooth structure more resistant to decay and promotes remineralization, which aids in repairing early demineralisation before the damage is even visible.

Most commonly, fluoride is applied topically to the teeth using gels, varnishes, toothpaste/dentifrices or mouth rinse. Systemic delivery involves fluoride supplementation

using drinking water, table salt or food supplements.

Both water and salt fluoridation are considered extremely cost-effective in preventing dental caries. The fluoridation of water is considered by the U.S. Centers for Disease Control and Prevention as „one of 10 great public health achievements of the 20th century”.

In some countries where large, centralized water systems are uncommon, fluoride is delivered to the population by fluoridating table salt. Salt fluoridation is recognized worldwide as a proven and viable means of consumer choice-related, community-based fluoridation where

water fluoridation is either technically or politically impossible.

What are the risks?

Health risks associated with fluoridation are mainly related to misuse and overdoses. Dental fluorosis is a condition caused by an excessive intake of fluorides characterized by yellow or brown stains on the teeth.

Some advocacy groups also publish reports on the hazards of fluoridation. The activists point to toxicity warnings on toothpaste, concluding that any substance needing such careful dosage must be dangerous. The World Health Organisation (WHO) states that fluoride has both bene-

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ficial and detrimental effects on human health. A high concentration of fluoride in drinking water increases the prevalence of dental fluorosis. In terms of general health, in communities where drinking water and foodstuffs are naturally too high in fluoride, skeletal fluorosis and bone fracture are the most relevant adverse effects.

However, the fact remains that in many countries the dramatic reductions in tooth decay in the past 30 years is due to fluoridation. When used appropriately, fluoridated salt is both safe and effective in preventing caries (Menghini et al. 1995).

Experiences with fluoridated salt

Fluoridation of domestic salt (FS) for human consumption was first initiated in Switzerland in 1955. Following the iodization of salt in Switzerland since 1922, fluoridation of salt for the prevention of dental disease was considered a valid approach based on experiences of fluoride in the prevention of dental caries (Wespi 1950). The results were excellent: the average DMFT in 12-year olds decreased steadily from 8 in 1964 to one in 1992 (Marthaler et al. 1994)

In the period 1986–1992, Jamaica, Costa Rica, Mexico and Uruguay introduced nationwide salt fluoridation. Results obtained from these countries illustrate significant reductions in caries prevalence in dental caries. In Jamaica, caries-free children increased from 2.8% to 61.7%, with 96% fluorosis free (Estupinan-Day et al. 2001). Caries prevalence decreased 73% in Costa Rica (Solorzano et al. 1999); 44% in Mexico and 40% in Uruguay (Irigoyen & Camacho 1997).

Today, fluoridated salt for household use is widely available in the following European countries: Switzerland, France, Germany, Spain, Austria, Hungary and Czech Republic.

Safety considerations

The combination of both salt and water fluoridation is not recommended. About 200-250 mg fluoride per kg of salt is reported to be equivalent to 0.5-1.2 ppm of fluoride in

water. Typically, a salt fluoride concentration of 250-310 mg/kg is used and does not present a risk for fluorosis. (Marthaler 2000)

Why salt?

The advantages of fluoridated salt for developing countries can be considered under the following items (Gillespie 2005):

- the ability to reach all sectors of the population at minimum cost
- low cost; it saves an average of \$250 per person per year in dental treatment for every \$1 spent
- little or no intentional action is needed of the public to benefit
- safety
- can be implemented irrespective of changes in water quality
- developing countries tend to have a reasonably stable diet, often based on rice, beans, pasta or similar products which require the use of table salt in their preparation.

Fluoridation of salt also profits from the experience gained in production, quality control and monitoring in respect of the iodisation of edible salt.

Conclusion

Untreated caries is a problem in many developing country. Salt fluoridation is said to be the most efficient public health preventive approach. Experience in Latin America has shown that putting fluoride in salt can reduce dental caries by as much as 84 percent (Estupinan-Day et al. 2001).

Fluoride toothpaste, rinses, varnish applications and supplements may have proven themselves in the West, but they are not universally affordable. Salt fluoridation is highly equitable, benefiting equally rich and poor, young and old, urban and rural dwellers, those with access to professional dental services and those without.

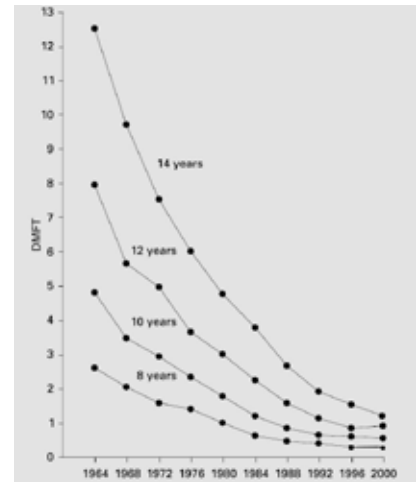


Figure 1. Average DMFT in children (permanent residents) in 16 communities of the Canton of Zurich, Switzerland, in which surveys were conducted every 4 years since 1964. (Marthaler 2004)

References

- Estupinan-Day SR, Baez R, Horowitz H, Warpeha R, Sutherland B and Thamer M. Salt fluoridation and dental caries in Jamaica. *Community Dent Oral Epidemiol* 2001; 29: 247-252.
- Gillespie G. Salt fluoridation - a public health success story. *Developing Dentistry* 2005; Vol. 6 (1), 1-6.
- Irigoyen-Camacho (1997) Dental caries in school children in Mexico City. *Salud Publica Mex* 1997;39:133-136.
- Irigoyen-Camacho (1997) Dental caries in school children in Mexico City. *Salud Publica Mex* 1997;39:133-136.
- Marthaler TM. Changes in the prevalence of dental caries: How much can be attributed to changes in diet? *Caries Res (suppl. 1)* 1990;24:3-15.
- Marthaler TM, Steiner M, Menghini GD, Bandi A: Caries prevalence in Switzerland. *Int Dent J* 1994;44:393-401.
- Marthaler TM. Salt Fluoridation in Europe, Comparisons with Latin America. In: Geertman RM, editor. *8th World Salt Symposium*. Amsterdam: Elsevier; 2000. p. 1021-1025.
- Marthaler TM. Changes in Dental Caries 1953-2003. *Caries Res* 2004;38:173-181
- Menghini G, Steiner M, Marthaler TM, Bandi A. Kariesbefall bei Schülern des Kantons Glarus in den Jahren 1974 bis 1992: Wirkung der Salzfluoridierung. *Schweiz Monatsschr Zahnmed* 1995;105:467-473.
- Solorzano, Beltran, Salas, Chavarria, Estupinan: Prevalence and trends of dental caries in Costa Rican school children from 1984 to 1999. *J of Dent Res* 90 (Spec Issue): 36 (2001)
- Wespi H J: Fluoridiertes Kochsalz zur Cariesprophylaxe. *Schweiz. Med Wschr* 80: 561-564 (1950)