

Multiple fluoride exposure

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Summary

Intensely studied in the last 70 years, the use of fluoride in dental medicine was proved to be one of the most revolutionary and efficient method for preventing the dental decay at a global level, and it still represents an actual subject of the oral health research.

The therapeutical sources of fluorides include water fluoridation, fluoride tablets and other products for systemical use, and the fluoride agents for topical applications. The access to all these sources is extremely variable and depends on general factors (social, cultural or environmental conditions) and also on individual factors (dietary habits, individual hygiene, and others).

The water fluoridation is an efficient preventive method, which can be applied at any age. The fluoride toothpastes are the topical fluoride agent generally recommended. The products for systemical use and the topical agents for professional use are recommended only in the non-fluoride areas and also for the patients with increased caries risk.

In order to have a maximum preventive effect in the same time with a minimum risk for producing dental fluorosis of permanent teeth, a revised way of using the fluoride products has to be adopted, on the basis of knowledge of the most efficient methods, of the possible combinations and also of the best way of application of all therapeutical fluoride sources.

Key words: fluoride, preventive method, therapeutical fluoride sources, fluorosis.

Recognizing the importance of the fluoride use for the prevention of dental caries directed to the appearance of an important number and extremely various application systems.

The exposure to multiple fluoride sources is a real fact of the 21st century, and has to be considered through at least two points of view:

- the simultaneous use of more fluoride sources provides a maximum anticaries effect because of the multiple mechanisms of action of the fluoride;

- the absence of control of total individual fluoride ingestion from multiple sources can lead to fluorosis on the permanent teeth.

It has to be said that the risk for dental fluorosis is more important in the areas where the modern fluoride products (toothpastes, solutions, varnishes, gels) are used on a large scale in the same time with the ingestion of fluoridated water [1,2].

For a correct use of all available fluoride sources aimed to obtain a maximum caries preventive effect and a minimum risk

of dental fluorosis, the following recommendations are needed:

- excepting the fluoridation methods indicated for extended communities, as the water fluoridation, or small communities, as the school-based fluoride mouthrinsing programs, the use of fluoride products has to be made on an individual basis, and the routine methods have to be avoided [3,4,5];

- the use of fluoride tablets depends on the fluoride concentration in public water sources;

- the fluoride effects are additive;

- for a maximum preventive effect, the fluoride products for systemical use (fluoridated water and fluoride tablets) can and must be used in combination with topical fluoride agents, but only at the dentist's prescription and after the evaluation of the individual oral health;

- it is necessary to use the most efficient fluoride agents and the most efficient methods of application for each patient;

- the most frequent negative effect of fluoride overdosing is the fluorosis of the permanent teeth; the risk of fluorosis is bigger until 7 years of age;

- correct and complete information regarding the positive and also the negative effects of the fluoride use have to be offered to all persons;

- the collaboration between the dentist, the family doctor and the parents is essential for fluoride adequate use;

- for the real success of the fluoride treatment the knowledge of all indications, counter-indications and possibilities for simultaneous use of multiple fluoride methods is necessary, as follows:

I. Fluoridated agents for systemical use:

- these agents are: the fluoridated water, the fluoride tablets and other products as the fluoridated salt, the fluoridated milk and the fluoridated sugar;

- the main concern is pointed towards water fluoridation (natural or artificial) and on tablets, the other products being used in small communities;

A) Water fluoridation:

- is the safest and most efficient method in preventing dental caries in extended communities;

- the water fluoride concentration recommended by the WHO in 1994 is between 0.5 and 1 ppm F/l;

- the decreasing of the dental caries prevalence after the use of fluoridated water is by 50-60% in both permanent and temporary dentition;

- the fluoride from the drinking water has both systemical and topical effect;

- in Romania, the drinking water is not artificially fluoridated (excepting Târgu-Mureș* town, where the drinking water was fluoridated for a short period of time, but with proved beneficial effects in reducing the prevalence of tooth caries).

B) Fluoridated tablets:

- they are not used in areas where the drinking water has an optimal fluoride concentration (more than 0.7 ppm F/l);

- the doses are individualized, according to age, weight, number of caries and other fluoride sources;

- they are not useful (but also not counter-indicated) in the intrauterine period, the benefit for the child's dentition being minimal;

- they are not used under 6 months of age;

- between 6 months and 3 years of age, the fluoridated tablets are given only on the advise of the dentist or pediatrician, and only to the children with increased caries risk, when the drinking water is not fluoridated (has less than 0.3 ppm F/l); the recommended dose is 0.25 mg/day; fluoridated toothpaste must not be used at this age if the child takes fluoridated tablets;

- between 3 and 6 years the recommended dose is 0.5 mg F/day if drinking water has less than 0.3 ppm F/l; if the water contains between 0.3 and 0.7 ppm F/l, the recommended dose is 0.25 mg F/day; fluoridated toothpaste can be used, but the fluoride concentration of the toothpaste has to be adapted for this age (500-600 ppm F) and the ingestion of the toothpaste has to be avoided;

- if fluoridated tablets are used, the daily dose has to be shared in two halves, to be administered in two different daily moments, other than the toothbrushing periods; fluoridated tablets should not be swallowed but slowly dissolved in the oral cavity, to obtain a maximum topical effect;

- the use of fluoridated tablets in children has to be supervised by the parents;

- over the age of 6 years, fluoridated tablets can be used along with fluoridated agents for topical use indicated by the dentist, according with the caries risk of the child;

- the container with fluoridated tablets must be kept out of children's reach, and the total amount of fluoride must not exceed 120 mg F [6,7].

II. Topical fluoridated agents for self-applications:

A) Fluoridated toothpaste:

- is generally indicated, in the fluoridated areas and also in the non-fluoridated areas, even for people that are using fluoridated tablets;

- fluoride concentration in the toothpaste has to be in accordance with the age, caries risk and periodontal status;

- the effect is greater if it is used continuously and correctly, at least two times/day;

- for the adults, the optimal concentration of fluoride in toothpaste is 1000-1100 ppm; greater concentrations are used for people with increased caries risk; at the end

of toothbrushing, adults must rinse easily only one time;

- under the age of 6 years a toothpaste with a low fluoride level has to be used (500-600 ppm), and the amount of toothpaste used at one brushing must be limited (5 mm); the children must be guided to spit the toothpaste after brushing, especially when they are taking fluoride tablets too [5,8];

- it is not used under the age of 3 if drinking water is fluoridated or fluoride tablets are used; even in non-fluoridated areas the use of fluoride toothpaste must be supervised so that the amount of toothpaste that will be swallowed can be limited;

- the use of fluoride toothpaste globally reduce the prevalence of tooth decay with 20-30%.

B) Fluoridated mouthrinses for self-applications:

- in the fluoridated areas, they are especially indicated in people with high caries risk, only at the dentist's recommendation;

- in the non-fluoridated areas, they are indicated to all people that do not use fluoride tablets;

- are used daily, weekly or twice a month, depending on the fluoride concentration of the solution;

- are counter-indicated under the age of 6;

- are indicated and extremely efficient in public health programs addressed to schoolchildren (such as The National Program of Dental Caries Prevention I.5, which is taking place since 2001 in Constanta, involving a number of 20,000 children with ages between 6 and 11, and consisting of weekly mouthrinses, for one minute, with the "Fluorostom" solution 0.275% NaF); this programs usually realize a decrease of carious prevalence by 25-35% [1,9,10];

- self-applications with fluoridated solutions are indicated daily in patients with

high carious risk, combined with professional applications of concentrated fluoridated agents; rinsing is made in the evening, after a complete toothbrushing using a fluoridated toothpaste.

C) Fluoridated gels for self-applications:

- are indicated, as well the solutions, only for the patients with high caries risk and who are not using fluoride tablets or fluoridated drinking water;

- are counter-indicated under the age of 6;
- are used in the evening, after toothbrushing with a fluoridated toothpaste;
- can be used combined with professional applications of fluoride topical agents.

III. Topical fluoridated agents for professional use:

- in fluoridated areas as well as in the non-fluoridated ones professional applications of topical fluoride agents are individualized and adapted to the degree of carious risk of each patient;

- for individuals with low cario-activity, with a good oral hygiene, who are frequently using fluoride toothpastes, professional application of fluoride concentrated agents is not a necessity, but neither a counter-indication; in this case, an application once a year is enough;

- in cases with medium cario-activity, these applications are indicated once or twice a year;

- in patients with a high cario-activity they are indicated 2-4 times/year; they can be used along with other fluoridated products (fluoridated toothpastes, solutions or gels for self-applications) [3,4,5].

A) Gels:

- are indicated in adults with medium or high carious risk;

- cannot be used in any way under the age of 6;

- are not applied on the whole arch in trays (individuals or custom-made) under the age of 16, but only isolated, on certain teeth [11,6];

- generally, twice a year applications are enough, especially if they are used along with self-applications of solutions or gels.

B) Concentrated solutions:

- are indicated, as well as gels, in adults with medium or high caries risk;

- are counter-indicated under the age of 6;

- are used 2-4 times/year (or in 4-5 applications weekly, then one application at 3 months until the reduction of the cario-activity) [3,1,7].

B) Fluoride varnishes:

- are indicated in children over 6 years old and in adults with medium or high carious risk;

- can be applied safely also in children of 3-6 years old, on the entire arch or only on certain dental surfaces considered "at risk" [12,13];

- for a lasting cariostatic effect, applications are made 2-4 times/year, depending on the caries risk of the patient (or three consecutive applications made in a period of 7-10 days, once a year) [14].

Certainly, fluoride is the most efficient agent for preventing tooth caries at this moment, and its use is safe and without any risk if it is made according to medical indications.

For the patient's best interest it is necessary to know exactly all the effects and all the methods for fluoride use, so that the caries-preventive potential reaches the maximum, and the side-effects are minimal.

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