

How to use fluoride effectively for dental caries prevention?



Even though the dental caries is preventable but its prevalence is still found in every age group of the population worldwide. Scientific evidence has enormously shown that fluoride is one of the most successful measures for caries prevention. The long-term story of community-based water and salt fluoridation in the United States and Switzerland respectively has confirmed the success of fluoride in public health for over 60 years. Besides the caries prevention by fluoride toothpaste and/or mouth-rinse has been developed since the seventieth. But why there is still dental caries in all population.

The latest caries status in India in 2007 showed 49% affected in the 12 year-old children with caries average dynamical mean-field theory (DMFT) 1.3 and increasing with age to 72% in the 35-44 years adult with average DMFT 3.5.^[1] This data is quite comparable with the recent national oral health survey in 2012 in Thailand which showed 52% at 12 years children at the same DMFT at 1.3 but higher in 35-44 years age group to DMFT at 6.0 with 87% affected.^[2] Whereas, the WHO global oral health data bank showed average DMFT 1.7 among children aged 12 years.^[3]

At the World Health Assembly in 2007, it had endorsed that member states should develop national plan for fluoride use.^[4] Effective fluoride use has been classified into three categories i.e.

- Community approach such as water, salt and milk fluoridation
- Professional approach such as fluoride varnish, gel and fluoride releasing dental material; and
- Self-care or home use such as fluoride toothpaste, mouth-rinse.

The mechanism of fluoride to enamel and dentine for caries prevention has been confirmed to be post-eruptive action due to demineralization-remineralization balance. The conventional systemic fluoride during tooth development might not be enough for long term prevention. Therefore, availability of fluoride in the oral cavity after tooth eruption is a key for caries prevention and should be there throughout life if the natural teeth are still remained in the oral cavity.

Self-care fluoride use is the most popular approach by daily tooth-brushing with fluoride toothpaste. But how to use fluoride toothpaste effectively is crucial for caries prevention in every age group. There are a few factors or hints that should be considered to use fluoride toothpaste most effectively^[5] i.e.,

- Fluoride concentration in the toothpaste: It is recommended 1,000-1,500 ppmF with the bio-available fluoride not less than 800 ppm
- The amount of fluoride toothpaste used must be carefully applied for prevention of both dental caries and fluorosis, according to age group as follows
 - 6 months (first primary tooth eruption) – 2 years (full primary teeth eruption) children use only smear amount of fluoride toothpaste on the brush (0.05 g toothpaste)
 - 2-6 years old children (until the first permanent tooth eruption) use pea size of fluoride toothpaste or along the width of the brush (0.25 g toothpaste)
 - 6 years children and beyond (as well as adult) use full length of fluoride toothpaste on the brush (1-1.5 g of toothpaste)
- The brushing time for fluoride to interact with the tooth composition should be at least 2 minutes (most people brush less than 1 minute)
- Post-brushing behavior, after brushing with fluoride toothpaste there should be minimum rinse (only once with handful, not a cup of water) in order to keep fluoride in the oral cavity to interact with the tooth for caries protection
- Tooth-brushing with fluoride toothpaste should be brushed twice daily

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- The right timing for brushing with fluoride toothpaste should be one in the morning after breakfast and another one at night before bed, in order to allow fluoride in the toothpaste to interact with the tooth composition for several hours with no interruption
- Fluoride toothpaste should be used for all age groups regardless of the amount of fluoride in water naturally, if the amount of fluoride toothpaste used correctly (as mentioned above), with no additional effect on dental fluorosis whatsoever.

In addition to brushing with fluoride toothpaste, fluoride mouth-rinse can also be used such as after lunch (when tooth-brushing is not possible) or after tooth-brushing when rinsing with too much water. In order to use fluoride mouth-rinse effectively it should contain 250 ppmF and be rinsed for 1 minute and no food or drink thereafter.^[5]

There is no doubt about the action of fluoride to inhibit demineralization and enhance remineralization which is the main reaction on the tooth surface and composition. But it's the matter of how to use fluoride effectively in the oral cavity. It needs time for fluoride to make chemical reaction with apatite of the enamel and dentine. Also the amount of fluoride should be high enough to react effectively.

The guideline or recommendation above should be considered for proper caries prevention, especially the primary prevention, that the dental profession is responsible to introduce appropriately to their patients and

the community. It is anticipated that using fluoride more effectively will definitely reduce the caries prevalence in developing countries in the future, similar to what happen in the developed countries in the past decades.

National plan for effective use of fluoride in caries prevention is therefore necessary especially for the primary teeth in the children. This is a path for achieving oral health throughout life in the future.

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