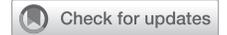


# PEDIATRIC DENTISTRY

## Caries progression in deciduous teeth



### BACKGROUND

Caries development is a dynamic process that has episodes of demineralization and those of remineralization. Noninvasive management can be effective for early lesions, especially topical fluoride treatments. Current protocols for noninvasive strategies to control caries and lower the risk for developing caries favor clinical care that does not involve surgery. The treatments to inhibit caries progression in deciduous teeth are focused on topical fluorides and sealants.

### METHODS

A literature review was done to identify studies published between 1960 and February 2017 that reported randomized controlled clinical trials (RCTs) and longitudinal studies of noninvasive preventive treatment for caries prevention or progression in the deciduous dentition. Ten articles were selected, with some reporting the mean percentage of lesion progression as progression estimates and some reporting the survival rate of lesions presented as the mean or median survival time in months as survival estimates.

### RESULTS

#### Progression Estimates

Six prospective studies reported progression estimates. The times of follow-up ranged from 24 to 30 months. One of these studies used salt fluoridation; the others involved drinking water with low or absent fluoride concentrations. Various fluoride products were used, including toothpastes, gels, rinses, varnishes, and tablets.

In the study performed in a population that practiced salt fluoridation, progression rates for approximal lesions of the enamel and outer dentin lesions did not differ significantly between the intervention group, which had approximal lesions sealed at baseline, and the control group, which had no sealing of lesions. When all lesions were considered, progression was 46% in the group with sealed lesions but 71% for non-sealed lesions.

Low-risk children treated with sodium fluoride gel twice a year and home use of fluoride toothpaste had nearly identical regression and progression estimates when compared to children who did not receive these treatments. In addition, giving a mixture of daily fluoride tablets plus twice daily brushing with fluoride toothpaste plus 3-monthly applications of 1% chlorhexidine gel and professional flossing yielded progression estimates of 61% after 24 months compared with 80% for the control group of patients.

Twice yearly applications of fluoride varnish plus fluoride rinse, daily fluoride tablet, and brushing with fluoride toothpaste yielded similar progression rates to having all the interventions except the fluoride varnish. However, lesion progression was 67% in the treatment group and 91% in the control group.

Children receiving a single application of both 40% silver fluoride and 10% stannous fluoride had progression of their enamel lesions in only 26% of the group at 24 months. However, 49% of the outer dentin lesions and 77% of the inner dentin lesions of this group progressed.

In a split-mouth study, teeth on the treatment side received twice yearly applications of fluoride varnish and those on the control side received a placebo varnish. The progression of inner enamel lesions was similar between the 2 sides. After 12 months, 71 new inner enamel lesions occurred, with 97% of them progressing into dentin during the next 12 months.

#### Survival Estimates

Four prospective studies with follow-up times between 24 and 84 months considered survival estimates. The fluoride varnish study reported already also noted that the mean survival estimate for the treatment and control lesions combined was 15 weeks.

Acidulated phosphate fluoride (APF) gel was applied annually, along with oral hygiene instruction and home use of fluoride toothpaste, in a study of Greek children. After 48 months, the inner and outer enamel lesions survived for median times of 31 and 22 months, respectively, before they progressed. The inner and outer dentin lesions survived for median times of 17 and 34 months, respectively. Cumulative survival rates for the enamel lesions were 40% and 29% for the outer and inner lesions. The outer dentin lesions had a cumulative survival rate of 42%. When the outer enamel lesions were considered, median survival was reported based on the classification of the child as low, medium, or high risk for caries. The median survival times for the outer enamel lesions were 47 months for low, 31 months for medium, and 21 months for high risk groups.

A comparison of Swedish and US children focused on the effects of sodium fluoride (NaF) solutions applied twice monthly. The Swedish children received NaF solution along with regular dental care for 48 months, whereas the US children were of low socioeconomic status and did not receive the fluoride treatment, with follow-up for 84 months. Outer enamel lesions had a mean survival of 12 months in both groups, whereas inner enamel lesions survived for a mean of 10 to 21 months in both groups. Water was not fluoridated in either situation.

When a comparison was done of children who did or did not receive regular dental care for 24 months, it was anticipated that those who received the regular intervention would see a caries preventive advantage. Actually, the mean survival time of the outer enamel lesions for those receiving regular care was 7 months, which was the same as for children not receiving the regular dental care.

## DISCUSSION

The results of these studies are mixed and suffer from many differences in methods, prevention modes, and the reporting of their findings. As a consequence of this, it's difficult to predict how long the various treatment strategies will arrest caries progression. Overall, the most effective treatment appears to be the combination of silver fluoride and stannous fluoride, although more evidence is needed before this can be recommended.

Pakdaman A, Montazeri A, Evans RW: Deciduous dentition approximal caries lesion progression and regression following preventive treatment: Literature review. *Austral Dent J* 63:422-428, 2018

### Clinical Significance

The focus of future research in this area should rest on the effectiveness of the different forms of topical fluoride in terms of their ability to arrest lesion progression in deciduous teeth. Approximal surface sealants should also be studied to determine how well these agents prevent caries.

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# SILVER DIAMINE FLUORIDE

## Silver diamine fluoride for caries prevention and arrest



### BACKGROUND

Caries experience is not the same for all socioeconomic groups, with lower income groups experiencing a higher rate of dental decay. Lower income groups are especially vulnerable to having a high dietary sugar intake, which is a primary cause of caries, along with a higher proportion of untreated dental decay. The factors of cost and availability or access to services are primary contributors to this situation. In addition, even when dental services are accessible, traditional restorative treatment can be difficult to deliver to young children who have severe dental disease or those with special management needs. Older adults have a similar situation, in that they have a higher percentage of untreated decay, which affects their quality of life, often as a result of challenges with mobility and comorbid conditions. Silver diamine fluoride (SDF) is a clear liquid that combines the antibacterial effects of silver and the remineralizing abilities of fluoride. The fluoride component strengthens the tooth structure being attacked by the acid components of the bacterial metabolism. In addition, SDF may interfere with the biofilm and kill bacteria that cause the imbalance leading to caries development and progression. SDF has been found in numerous studies to be safe, effective, efficient, easy to apply, minimally invasive and painless, and affordable, which is important for the populations most in need of it. The most apparent drawback is that the precipitation of silver byproducts in the dental tissues stains the caries lesions black as they become arrested (Figure 1). The findings of current systematic reviews and meta-analyses concerning SDF as a treatment to arrest caries were outlined.

### METHODS

Various databases were searched for systematic reviews reported in English and published or accepted for publication through March 2018. Six systematic reviews complied with most of the guidelines set forth in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

### RESULTS

The clinical trials and systematic reviews indicate that SDF arrests caries in primary teeth as well as root caries in elderly patients. In addition, it may prevent the formation of new caries. It should be noted that some lesions don't become arrested, but anterior teeth have considerably higher rates of arrest than posterior teeth (Box 2). A guideline for its use has been published by the American Academy of Pediatric Dentistry, and the World Health Organization has concluded that SDF should be used as an alternative procedure for the tertiary prevention of caries. This is based on its ability to reduce the negative impact of established disease by restoring function and reducing disease-related complications, thus improving the quality of life for children.

### Adverse Effects

There are no acute side effects of SDF, although minor side effects have been reported. These include transient gingival irritation and a metallic taste in a few patients. The gingival irritations tend to heal within a couple of days. SDF should not be used on lesions suspected to involve the pulp because it will not prevent further progression of the infection into surrounding tissues.

The primary side effect of SDF use is its dark staining of carious tooth tissue. Parents consider staining unacceptable in some