

COVER STORY

Are topical fluorides effective for treating incipient carious lesions?

A systematic review and meta-analysis

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Early caries detection and the use of noninvasive interventions are important approaches for controlling caries progression.¹ It has long been known that not all lesions progress to cavitation.² Thus, the challenge has been to determine which white-spot lesions will progress to cavitation. Therefore, the proper assessment of lesion activity is crucial to provide appropriate clinical decisions.³⁻⁵

In this sense, diet and dental biofilm control are sufficient for monitoring inactive enamel lesions.

Conversely, topical fluorides, such as gels and varnishes, have been used as adjuvants for the treatment of active white-spot lesions.^{1,6}

The evidence on the effect of topical fluorides on the prevention of dental caries has been extensively reported,⁷⁻¹² presenting a clear benefit to fluoride varnish application at least twice per year for caries prevention in children and adults.^{9,11} Likewise, professional acidulated phosphate fluoride (APF) gel applications 3 times per year are effective for caries inhibition.^{10,11}

However, the protocol for the use of fluorides as a therapeutic intent is not clear. When gels or varnishes are used for therapeutic purposes, some authors have recommended 4 to 8 weekly or biweekly sessions¹³ or even daily applications.¹⁴



Supplemental material is available online.

ABSTRACT

Background. This systematic review and meta-analysis evaluated the effectiveness of professional topical fluoride application (gels or varnishes) on the reversal treatment of incipient enamel carious lesions in primary or permanent dentition.

Methods. Literature searching was carried out by the authors in PubMed (MEDLINE), Cochrane Central Register of Controlled Trials, Turning Research Into Practice, and ClinicalTrials.gov to verify the clinical trials available about the outcome. From 754 potentially eligible studies, 21 were selected for full-text analysis, 5 were included for review, and 3 for meta-analysis. The statistical analysis was performed only for studies assessing fluoride varnish; there were insufficient data to perform it for fluoride gel studies. Two reviewers independently selected the studies, extracted the data, and assessed the risk of bias. Pooled-effect estimates were expressed as the weighted mean difference between groups.

Results. The therapeutic methods ranged considerably regarding the fluoride application protocols. There was a significant trend of effectiveness of fluoride varnish on the reversal of incipient enamel carious lesions ($P < .05$). High heterogeneity was found in the meta-analysis.

Conclusions. Fluoride varnish seems to be an effective treatment for the reversal of incipient carious lesions in primary and permanent dentition; however, further clinical trials concerning efficacy of topical fluorides for treating those lesions are still required, mainly regarding the fluoride gel.

Practical Implications. Considering the scientific evidence on topical fluorides, pediatric dentists can use fluoride varnishes as an adjuvant for the treatment of active white-spot lesions in primary or permanent dentition.

Key Words. Enamel caries; topical fluorides; non-cavitated carious lesions; remineralization; systematic review.

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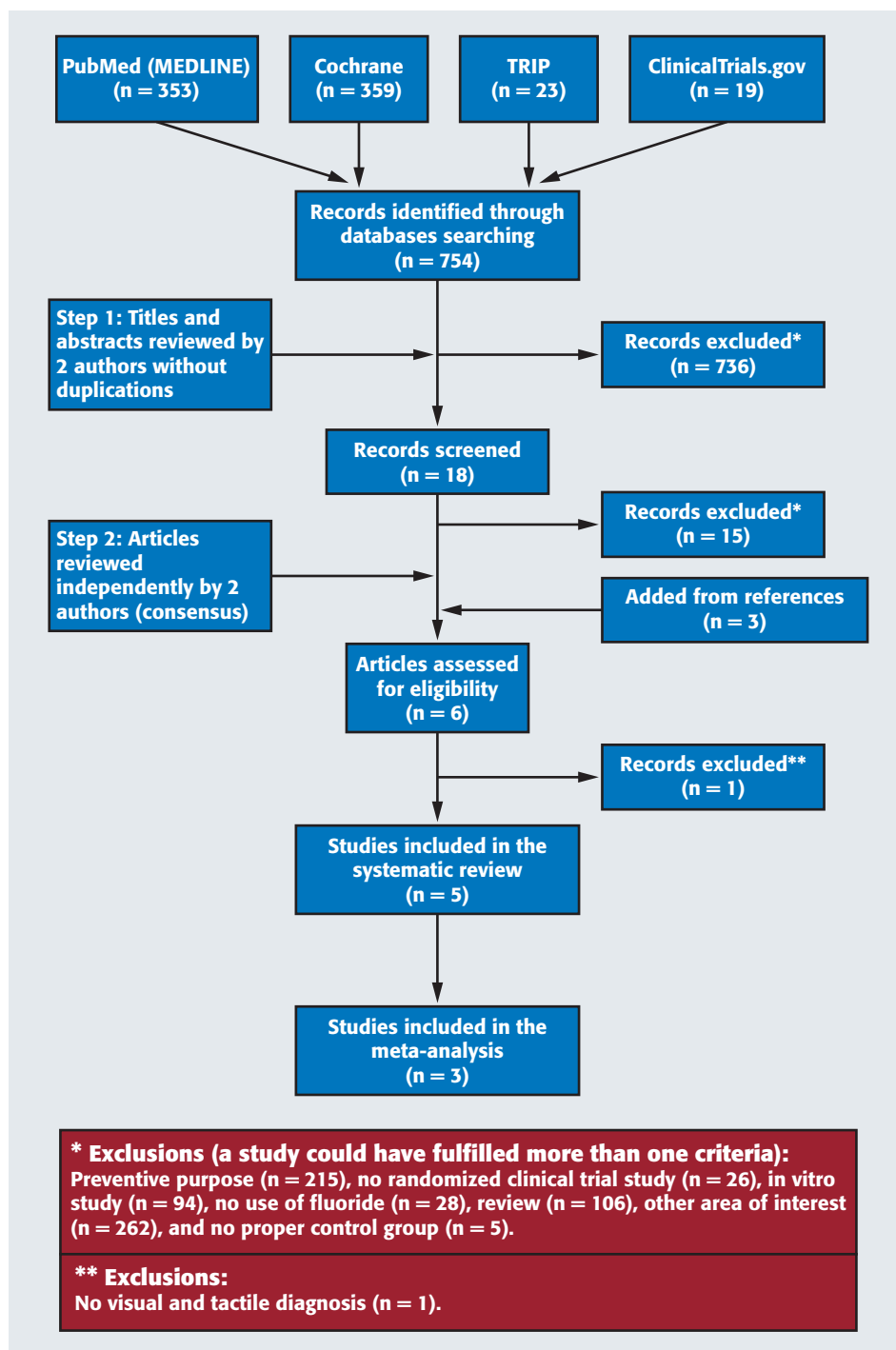


Figure 1. Flow diagram of the study selection according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.²¹ TRIP: Turning Research Into Practice.

Professional topical fluoride application enhances remineralization of active enamel carious lesions because the quantities of calcium and phosphate lost by the dental structure can be replaced by the enamel in

fluorapatite form.¹⁵ The action of topical fluoride has been verified in *in vitro*¹⁶ and *in situ* studies^{14,17-20} regarding the formation of fluoride and its remineralizing ability; however, there is limited clinical evidence on its actual effectiveness. To the best of our knowledge, a systematic quantitative evaluation of the available evidence on the therapeutic effect of the main modalities of topically applied fluoride has never been undertaken. Moreover, comparisons of regimens and agents for remineralization of incipient carious lesions may provide more useful information for clinical evidence-based decision making.

Therefore, the aim of this study was to systematically and quantitatively evaluate the effectiveness of professional topical fluoride applications (gels or varnishes) on arresting the progression of early enamel carious lesions in primary or permanent teeth.

METHODS

We conducted this systematic review according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.²¹

Search strategy and selection criteria. We performed a comprehensive literature search

ABBREVIATION KEY. APF: Acidulated phosphate fluoride. D_ES: Decayed surfaces with initial enamel lesions. NA: Not applicable. NR: Not reported. TRIP: Turning Research Into Practice.

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