

Fluoride Varnishes

KEVIN J. DONLY, DDS, MS

ABSTRACT Fluoride varnishes are available in the United States, and the Federal Drug Administration has approved a fluoride varnish for use as a cavity preparation lining varnish and as a tooth desensitizing agent. The literature, however, supports the use of fluoride varnishes to inhibit tooth demineralization and enhance remineralization. The purpose of this paper is to present an overview of literature and make recommendations according to the available scientific evidence. Findings support the use of fluoride varnishes as a safe and effective topical fluoride agent.

AUTHORS

KEVIN J. DONLY, DDS, MS, IS A PROFESSOR AND POSTDOCTORAL PROGRAM DIRECTOR OF THE DEPARTMENT OF PEDIATRIC DENTISTRY AT THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO DENTAL SCHOOL.

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Fluoride varnishes, although available in Europe for more than two decades, have more recently been introduced to the U.S. marketplace. These fluoride varnishes are recognized by the Federal Drug Administration as a device to be used as a desensitizing agent and a cavity lining varnish.^{1,2} Although fluoridated varnishes are officially recognized as effective cavity varnishes³ and desensitizing agents,^{4,5} research has demonstrated their caries prevention potential. The purpose of this paper is to provide data associated with the caries inhibition effectiveness associated with fluoride varnishes and to make recommendations for clinical use as a preventive dentistry agent.

Fluoride Varnishes Available

There are four fluoridated varnishes marketed in the United States:

- Duraphat (Colgate Oral Pharmaceuticals, Inc., Canton, Mass).

Duraphat is a 5 percent sodium fluoride varnish provided in tubes containing 10 ml of product.

- Duraflor (Pharmascience, Montreal, Canada). Duraflor is also a 5 percent sodium fluoride varnish, which is provided in 10 ml tubes.
- Fluor Protector (Ivoclar/Vivadent, Amherst, N.Y.). Fluor Protector is a 1 percent difluorsilane varnish provided in 1 ml ampules and 0.4 ml single dose units.
- Cavity Shield (OMNII Oral Pharmaceuticals, West Palm Beach, Fla.). Cavity Shield is a 5 percent sodium fluoride varnish but comes in unit-dose packages with an application brush.

Concern has been directed toward the potential settling of sodium fluoride in product packaging. A recent study indicated that the sodium fluoride contained in cavity varnishes was not equally distributed throughout the varnish tube, resulting in varying doses to be obtained when the

fluoride varnish was extruded.⁶ Results from the study demonstrated a more uniform fluoride content in Duraphat tubes and Cavity Shield unit-dose packages than in Duraflor tubes. An advertised advantage to Cavity Shield is that the unit dose can be easily mixed and applied to teeth, eliminating the concern of an unknown dose of fluoride.

Caries Prevention Effectiveness

Numerous studies document the caries-preventive effectiveness of fluoride varnish. Further in vivo and in vitro studies have addressed the use of fluoride varnishes on higher caries-risk patients, such as those receiving orthodontic treatment.⁷⁻⁹ Although data varies in reported effectiveness, a significant reduction in caries is noted.¹⁰⁻³¹ Several comparative trials have demonstrated equal or superior caries-prevention benefits of 1.23 percent acidulated phosphate fluoride, the standard professionally applied topical fluoride used in the United States.³²⁻³⁴

Although a majority of clinical trials are associated with caries inhibition in the permanent dentition, there are some studies related to the primary dentition.³⁵⁻⁴² The average caries reduction in the primary dentition, where fluoride varnishes were typically applied twice per year, appears to be less than the caries reduction seen in the permanent dentition; however more clinical trials are necessary, particularly focusing on very young children.

Remineralization

There is minimal information regarding the effectiveness of fluoridated varnishes to enhance remineralization. Preliminary in vitro and in vivo studies, however, indicate that fluoride varnish has the potential to aid in the remineralization of incipient caries.⁴³⁻⁵⁰

Occlusal Caries Prevention

Several studies have compared the use of fluoride varnishes and sealants to prevent occlusal caries. Findings from these studies indicate sealants to be the most effective preventive agent for occlusal tooth surfaces.⁵¹⁻⁵⁴

Fluoride Varnish Application

The application of fluoride varnish is simple. A prophylaxis is not necessary prior to fluoride varnish application, but brushing with a toothbrush has been recommended.⁵⁵⁻⁵⁶ If there is no evidence of heavy plaque or debris on the teeth, wiping them with cotton gauze is adequate. The teeth can remain moist and the varnish will still adhere to the teeth. A total of 0.3 to 0.6 ml of fluoride varnish is sufficient to cover the dentition. After application, the patient is requested not to brush his or her teeth for the remainder of the day but to return to routine oral hygiene maintenance the following day.

Safety

A 5 percent sodium fluoride preparation is 50,000 ppm sodium fluoride. Although this is a relatively high-dose fluoride preparation, a minimal amount is applied (0.3 to 0.6 ml).⁵⁷ This can be converted to a range of approximately 5 to 12 mg fluoride. The fluoride varnish slowly breaks away from the tooth surface, and research has demonstrated that a negligible amount is ingested. Ekstrand and colleagues reported a low plasma fluoride level following placement of a 5 percent fluoride varnish, which was comparable to plasma fluoride levels experienced after toothbrushing with a fluoridated dentifrice.⁵⁸ This level is significantly lower than plasma fluoride levels seen after a professionally applied 1.23 percent acidulated phosphate fluoride.⁵⁹ The acidulated phosphate fluoride, even when delivered in trays, dissipates throughout the mouth with

subsequent swallowing of the fluoride.

Due to the difficulty of placing topical fluoride delivery trays in children younger than 5, difficulty in obtaining the cooperation of these young children to use a slow-speed suction to remove excess fluoride from the mouth as it dissipates from the delivery tray, and the inability to keep young children from swallowing the acidulated phosphate fluoride in the delivery tray, this young population could benefit from the fluoridated varnishes. Ease of varnish application, safety, and efficacy comparable to 1.23% acidulated phosphate fluoride makes the use of fluoride varnish on young children rational.

Summary

There is overwhelming evidence that fluoride varnish is effective at inhibiting tooth demineralization. Fluoride varnish is as effective in caries reduction as other professionally applied topical fluoride regimens currently used. The following lists of indications and contraindications summarizes recommendations:

Indications

Biannual professionally applied topical fluoride agent on moderate and high-risk patients, particularly children younger than 5.

- Root desensitizing agent.
- Cavity varnish, in place of a nonfluoridated cavity varnish.
- Institutionalized patients.
- Exposed root surfaces.
- Patients receiving orthodontic therapy.
- Contraindications
- Treatment of cavitated lesions.
- Low risk, caries-free patients, living in a fluoridated community.
- Circumstances where post-fluoride treatment esthetics is a concern.

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To request a printed copy of this article, please contact: Kevin J Donly, DDS, MS, Department of Pediatric Dentistry, Dental School, University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX 78229-3900, or at donly@uthscsa.edu.