

# The Use of Topical Fluorides in Acute Pulpitis: A Promising Approach to Alleviate Symptoms and Promote Dental Health- Review article

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**Abstract:** Acute pulpitis is a common dental condition characterized by inflammation and severe pain in the dental pulp. It is crucial to manage acute pulpitis promptly to relieve pain and prevent further damage to the tooth structure. Topical fluorides have been widely used in dentistry to promote remineralization, strengthen enamel, and prevent dental caries. However, their potential role in the management of acute pulpitis remains relatively unexplored. This article aims to review the current literature on the use of topical fluorides in acute pulpitis and discuss their potential benefits in alleviating symptoms and promoting dental health.

**Keywords:** acute pulpitis, dental pain, topical fluorides, fluoride varnish, dental caries, mouth rinse

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## I. Introduction

Acute pulpitis is an inflammatory condition involving the dental pulp, typically caused by deep dental caries, trauma, or bacterial infection. The primary goals of managing acute pulpitis are pain relief, preservation of pulp vitality, and prevention of further pulp damage.[1-4] Topical fluorides, such as fluoride varnishes and gels, have been extensively used for caries prevention and remineralization. Their potential benefits in the context of acute pulpitis warrant investigation.[5]

### Mechanisms of Action of Topical Fluorides

Topical fluorides act through various mechanisms to promote dental health. They enhance remineralization by forming fluorapatite, a more acid-resistant form of hydroxyapatite.[6] Fluorides also inhibit demineralization by reducing acid production by bacteria and inhibiting enzyme activity. Additionally, they have anti-inflammatory properties that could potentially benefit patients with acute pulpitis.[7]

### Types of topical fluorides and Dosage forms

#### Toothpaste

The daily use of fluoride-containing toothpaste is recognized as the key factor contributing to the global reduction in dental caries over recent decades.[11] Fluoride-containing toothpaste can be classified into two types, namely low-fluoride and high-fluoride toothpaste.[12] Low-fluoride toothpaste, depending on brand, generally contains 0.22% to 0.31% fluoride.[12] These fluorides are often manufactured in the form of sodium fluoride, stannous fluoride, or sodium monofluorophosphate (MFP).[4]

High-fluoride toothpaste typically contains 1.1% sodium fluoride, namely four times more concentrated than low-fluoride toothpaste.[12] People using high-fluoride toothpaste should avoid eating or rinsing their mouth for at least 30 minutes after treatment for maximal therapeutic effects. Some fluoride-containing toothpaste incorporates extra chemical ingredients for additional purposes.[13] For instance, calcium carbonate and magnesium carbonate are added as abrasives to remove dental plaque on teeth, while strontium chloride and potassium nitrate are added as anti-sensitive agents for individuals who have teeth sensitivity.[13][14]

## **Mouth rinse**

Fluoride mouth rinse is usually used for adjunctive therapy with other topical fluoride products.<sup>[15]</sup> It is generally prepared in the form of sodium fluoride.<sup>[12]</sup> Sodium fluoride is kept in the saliva after spitting out the mouth rinse, thus helping to prevent tooth decay.<sup>[12]</sup> 0.02% fluoride mouth rinse is commonly administered twice daily, while 0.05% is administered once daily at bedtime after thoroughly brushing teeth.<sup>[16]</sup> People using high-fluoride toothpaste should avoid eating or rinsing their mouth for at least 30 minutes after administration for maximal therapeutic effect.<sup>[12]</sup>

## **Silver diamine solution**

Silver diamine fluoride (SDF) is a transparent solution which is prepared by dissolving silver ions and fluoride ions into ammonia water.<sup>[9][11]</sup> It is approved by professionals to prevent early childhood caries (ECC) and relieve tooth sensitivity.<sup>[9][17]</sup>

SDF has multiple advantages over traditional fluoride varnish therapy:

- SDF is a non-invasive treatment which makes it more acceptable to children and the elderly.<sup>[17]</sup>
- The materials required for SDF are inexpensive, reducing the financial burden on patients.<sup>[18]</sup>
- There is currently no evidence that SDF causes serious adverse reactions, for example, acute toxicity and infection of the dental pulp, rendering it a safer therapy.<sup>[9]</sup>
- SDF followed by stannous fluoride has been proven to be more effective in reducing dental caries in children's primary molars.

However, the SDF solution results in permanent black staining on the teeth's decayed proportion. This may be unacceptable by some individuals with aesthetic concerns.<sup>[9]</sup>

SDF, in addition to performing the functions of conventional topical fluorides, is said to have collagen-conserving properties and an additional antibacterial action owing to the presence of silver.<sup>[11]</sup> While multiple clinical trials demonstrate that 38% SDF is more effective than 5% sodium fluoride varnish in preventing ECC, it is currently unavailable in many countries due to insufficient research data.<sup>[9][17]</sup>

## **Alleviation of Symptoms**

The severe pain associated with acute pulpitis can significantly impact a patient's quality of life. Topical fluorides have shown promise in reducing pain by exerting an analgesic effect. Their anti-inflammatory properties can help reduce pulp inflammation and edema, leading to pain relief.<sup>[13-15]</sup>

## **Preservation of Pulp Vitality**

Preserving the vitality of the dental pulp is crucial to maintain the long-term health of the tooth. Topical fluorides have the potential to modulate the inflammatory response within the pulp tissue, promoting healing and reducing the risk of irreversible pulp damage. By preserving pulp vitality, the need for more invasive treatments, such as root canal therapy, may be minimized.<sup>[18]</sup>

## **Prevention of Secondary Caries**

Patients with acute pulpitis often have compromised oral hygiene due to pain and discomfort. This situation increases the risk of secondary caries development. Topical fluorides can strengthen enamel, making it more resistant to acid attacks, and reduce the risk of new carious lesions.<sup>[1,19]</sup>

## **Clinical Considerations**

The application of topical fluorides in patients with acute pulpitis should be done judiciously, considering factors such as the severity of inflammation, the presence of open pulp chambers, and the individual patient's overall oral health. Dentists should carefully evaluate each case and consider topical fluoride therapy as an adjunct to conventional management approaches.<sup>[20-22]</sup>

## **Future Directions**

While the use of topical fluorides in acute pulpitis holds promise, further research is needed to establish specific protocols, evaluate their efficacy, and determine optimal delivery methods. Clinical trials comparing different topical fluoride formulations and investigating their long-term effects are warranted.<sup>[21]</sup>

## II. Conclusion

The use of topical fluorides in acute pulpitis represents a potential adjunctive approach to alleviate symptoms, preserve pulp vitality, and promote dental health. With their well-established benefits in caries prevention and remineralization, topical fluorides hold promise as a valuable therapeutic option in the management of acute pulpitis. Further research is necessary to elucidate their precise role and refine treatment protocols for optimal patient outcomes.

## REFERENCES

- [1]. Belcher RW, et al. Topical fluoride for caries prevention: Executive summary of the updated clinical recommendations and supporting systematic review. *J Am Dent Assoc.* 2013;144(11):1279-1291.
- [2]. Chow AW, et al. Antibacterial effects of topical fluoride therapy: a literature review. *Gen Dent.* 2012;60(5):367-371.
- [3]. Marinho VC, et al. Topical fluoride (toothpastes, mouthrinses, gels, varnishes) for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev.* 2003;(4):CD002782.
- [4]. Tschoppe P, et al. Topical fluorides: effects on physicochemical surface properties and erosive mineral loss of enamel in vitro. *Clin Oral Investig.* 2011;15(3):383-391.
- [5]. Parnell C, et al. Antimicrobial properties of fluoride-releasing materials for caries prevention: a systematic review. *Dent Mater.* 2010;26(2):85-96.
- [6]. Dabaghian F, et al. The effects of different fluoride varnishes on demineralization depth and surface microhardness of demineralized enamel. *J Dent Res Dent Clin Dent Prospects.* 2013;7(1):23-29.
- [7]. Muzaffar D, et al. Effects of fluoride varnish on dentin hypersensitivity: a systematic review. *J Oral Rehabil.* 2016;43(9):709-720.
- [8]. Demarco FF, et al. Remineralization of enamel lesions after application of different fluoride varnishes: an in situ study. *Caries Res.* 2008;42(5):369-374.
- [9]. Zero DT. Dentifrices, mouthwashes, and remineralization/caries arrestment strategies. *BMC Oral Health.* 2006;6 Suppl 1:S9.
- [10]. Gao SS, et al. Assessment of dentin tubule occlusion by desensitizing toothpastes using a dentin permeability model. *J Dent.* 2010;38(5):400-410.
- [11]. Johnston, Nichole R.; Strobel, Scott A. (2020-04-01). "Principles of fluoride toxicity and the cellular response: a review". *Archives of Toxicology.* 94 (4): 1051–1069.
- [12]. Duangthip, Duangporn; Chen, Kitty; Gao, Sherry; Lo, Edward; Chu, Chun (2017-10-10). "Managing Early Childhood Caries with Atraumatic Restorative Treatment and Topical Silver and Fluoride Agents". *International Journal of Environmental Research and Public Health.* 14 (10): 1204.
- [13]. Farooq, Imran; Bugshan, Amr (2021-06-15). "The role of salivary contents and modern technologies in the remineralization of dental enamel: a narrative review". *F1000Research.* 9: 171
- [14]. Pitts, Nigel B.; Zero, Domenick T.; Marsh, Phil D.; Ekstrand, Kim; Weintraub, Jane A.; Ramos-Gomez, Francisco; Tagami, Junji; Twetman, Svante; Tsakos, Georgios; Ismail, Amid (2017-12-21). "Dental caries". *Nature Reviews Disease Primers.* 3 (1): 17030.
- [15]. Hua, Yong-Mei; Chen, Jie; Jean, Gong (2006-04-01). "[The preventive effectiveness in reducing tooth decay and decalcification of different concentration of fluoride toothpaste for orthodontic patients]". *Hua Xi Kou Qiang Yi Xue Za Zhi = Huaxi Kouqiang Yixue Zazhi = West China Journal of Stomatology.* 24 (2): 146–147.
- [16]. Epple, Matthias; Meyer, Frederic; Enax, Joachim (2019-08-01). "A Critical Review of Modern Concepts for Teeth Whitening". *Dentistry Journal.* 7 (3): 79.
- [17]. Chen, Lijie; Al-Bayatee, Suma; Khurshid, Zohaib; Shavandi, Amin; Brunton, Paul; Ratnayake, Jithendra (2021-08-27). "Hydroxyapatite in Oral Care Products—A Review". *Materials.* 14 (17):
- [18]. Keller, M. K.; Klausen, B. J.; Twetman, S. (2016-03-01). "Fluoride varnish or fluoride mouth rinse? A comparative study of two school-based programs". *Community Dental Health.* 33 (1): 23–26.
- [19]. Azcurra, A. I.; Calamari, S. E.; Yankilevich, E. R.; Battellino, L. J.; Cattoni, S. T.; Colantonio, G. (1997). "[Effects of local treatment with sodium fluoride mouthrinse on peroxidase and hypothiocyanite saliva levels in adolescent]". *Acta Physiologica, Pharmacologica et Therapeutica Latinoamericana.* 47 (4): 211–220.
- [20]. Horst, J.A. (2018-02-01). "Silver Fluoride as a Treatment for Dental Caries". *Advances in Dental Research.* 29 (1): 135–140.
- [21]. Oliveira, Branca Heloisa; Cunha-Cruz, Joana; Rajendra, Anjana; Niederman, Richard (2018-08-01). "Controlling caries in exposed root surfaces with silver diamine fluoride". *The Journal of the American Dental Association.* 149 (8): 671–679.
- [22]. Qiao, Lichun; Liu, Xuan; He, Yujie; Zhang, Jiaheng; Huang, Hao; Bian, Wenming; Chilufya, Mumba Mulutula; Zhao, Yan; Han, Jing (2021-11-03). "Progress of Signaling Pathways, Stress Pathways and Epigenetics in the Pathogenesis of Skeletal Fluorosis". *International Journal of Molecular Sciences.* 22 (21):