



Article Information

Received date: July 01, 2020

Published date: July 13, 2020

*Corresponding author

Pramod Yadav, Department of Periodontics and Community Dentistry, Dr. Z A Dental College, Aligarh Muslim University, India

Keywords

Fluoride; Prophylactic Paste; SDF

Distributed under Creative Commons
CC-BY 4.0

Professionally Applied Topical Fluoride in Dentistry: A Review

Ankita Bansal¹ and Pramod Yadav^{2*}

¹Department of Periodontics and Community Dentistry, Dr. Z A Dental College & Hospital, India

²Department of Public Health Dentistry, R.R. Dental College & Hospital, India

Abstract

Dental caries is still one of the major public health problems. The most effective way of caries prevention is the use of fluoride. Fluoride has become an important tool in preventive dentistry. Current research is focused on the development of strategies to improve fluoride efficacy. Fluoride therapy in the form of fluoride devices, prophylaxis paste or re-mineralizing agents has been used extensively as a caries-preventive intervention. The purpose of this review is to inform the reader about new research related to the use of fluoride for the prevention of dental caries.

Introduction

Fluoride occupies a unique position in preventive dentistry [1]. By current convention, many dentists and dental hygienists routinely are administering professional topical fluoride treatments to patients at their preventive maintenance appointments [2]. Professionally-applied topical fluoride treatments are efficacious in reducing prevalence of dental caries. Thus, a wide variety of fluorides i.e. slow releasing devices, prophylaxis paste, remineralizing agents and in restorative materials are now available to dental professionals for use in clinical practice and for prescribed use by patients at home [3]. Therefore "Professionally Applied Topical fluoride in Dentistry" need further exploration.

Silver Diamine Fluoride Ag (NH₂)₂F

Silver diamine fluoride was introduced in Japan in 1970s as Saforide solution (J Morita Company, Japan) [4] Silver diamine fluoride (SDF) is an anti - cariogenic agent, which is deemed to be very effective, especially in pediatric dentistry [5]. It is used to promote remineralization of tooth mineral hydroxyapatite (HA). Silver diamine fluoride has been used to arrest and slow the rate of caries progression [6]. At the beginning of 21st century, its use started again in China as caries arresting agent in school children [7].

Remineralizing Agents

Casein Derivatives

Casein Phosphopeptide Amorphous Calcium Phosphate (CPP-ACP): CPP-ACP is a useful cario-static agent for the control of dental caries. It can be used as:

- An adjunct preventive therapy to reduce caries in high-risk patients.
- Reduce dental erosion in patients with gastric reflux or other disorders, to reduce decalcification in orthodontic patients.
- To repair enamel in cases involving white-spot lesions.
- Orthodontic decalcification or fluorosis or before and after tooth whitening and to desensitize teeth [2].

Clinical Application

MI Varnish™: It contains 5% sodium fluoride.

Daily Care Products: MI Paste™ and MI Paste Plus™. It contains 0.2% sodium fluoride [8].

Calcium Phosphate Systems

Tri-Calcium Phosphate (TCP)²

Clinical Application: Vanish Varnish 5% NaF& Vanish XT Varnish

Daily Care Products: Clinpro Toothpaste 5000 (5,000 ppm NaF& TCP) & Prevident Booster Plus (5,000 ppm NaF& TCP).

Amorphous Calcium Phosphate (ACP)

Clinical Application: Enamel Pro Varnish (5% NaF& ACP); Enamel Pro Prophyl Paste & Enamel Pro APF (1.23% non-acidulated fluoride & ACP).

Daily Application: Relief Oral Care Gel (1,000 ppm NaF, KNO₃ & ACP).

Whitening Products: Day white / Night white, only whitening with CP added [9].

Pronamel

It contains 5% potassium nitrate to help relieve tooth sensitivity. The fluoride component is sodium fluoride, giving 0.15% w/v fluoride ion, or 1500 ppm [2].

Enamelon



Enamel consists of unstabilized calcium and phosphate salts with sodium fluoride.

Calcium Sodium Phosphosilicate (CSP)

Novamin®

Daily Care Products: SensodyneNupro New Solutions (5,000 ppm NaF& CSP) & Renew Toothpaste (5,000 ppm NaF& CSP) [2].

Di Calcium Phosphate Dihydrate (DCPD): DCPD abrasive is unique for fluoride stability. Toothpaste containing MFP and DCPD was significantly more effective than MFP/silica toothpaste.

Ion Exchange Resins (IER): The advantage of ion exchange system is that it provides a controlled release system for the anti-cariou treatment of dental tissues [2].

Slow-Release Fluoride Devices

Intra oral fluoride releasing devices have been introduced in dentistry in an attempt to overcome the issues of patient compliance for high caries-risk groups [10].

Types of Fluoride-Releasing Devices

- i. The copolymer membrane type
- ii. The glass bead
- iii. Sodium fluoride (NaF) and hydroxyapatite more recently described &
- iv. Slow fluoride release tablets for intrabuccal use

i. Copolymer membrane device

It was developed by Cowzar et al. (1976) in United States. This system was designed as a membrane-controlled reservoir-type and the inner core consists of hydroxyethyl methacrylate (HEMA).

ii. Glass Device

The glass device was developed by Curzon in 1984 in United Kingdom. The fluoride glass device dissolves slowly when moist in saliva, releasing fluoride without significantly affecting the device's integrity.

iii. Hydroxyapatite - Eudragit RS100 diffusion controlled Fluoride system

It contains 18 mg of NaF and is intended to release 0.15 mg F/day [11].

iv. Slow fluoride release tablets (For intrabuccal use)

Tablets of 160-200mg were formulated which were intended to be fixed on a tooth. Sodium fluoride is added by mechanical mixing or an impregnation method. Such a mode of fluoride administration can be extended to all chronic pathologies of the buccal cavity [10].

Fluoride devices have been proven to be effective in achieving:

- a. Caries reduction
- b. Remineralization
- c. Dental sensitivity reduction [12]

Fluoride Prophylaxis Paste

A dental prophylaxis with a mildly abrasive paste using a brush or rubber cup in a dental hand piece usually precedes topical fluoride application. If fluoride containing prophylactic paste is used the lost fluoride is replenished and there is small but significant net gain in the concentration of fluoride [13].

Glitter Prophy Paste

ZoobyProphy Paste (Denticator)

Hygiene Pro Glisten Prophy Paste

Fusion Prophy Paste

Glitz Prophy Paste

Butler Prophy Paste

Defend Prophy Paste[14]

Conclusion

For the dental professional to be able to choose the formula and concentration of the topical agent which is most effective in managing a specific dental problem for a particular patient, it is necessary to be aware of a number of properties of the agent selected. Despite its long standing history and use clinicians should have basic knowledge of the products and of the safe use of these products. Communication to the patient is an important adjunct to maximize the benefits and minimize the risks. Thus to conclude it can be said that: "An Ounce of Prevention is Worth a Pound of Cure".

References

1. (2014) Tell me about Sundry Fluoride. The British Dental Health Foundation.
2. Pradeep K, Prasanna K (2011) Remineralizing Agents. *International Journal of Dental Case Reports* 1(2): 73-84.
3. Bansal A, Ingle NA, Kaur N, Ingle E (2015) Recent advancements in fluoride: A systematic review. *J IntSoc Prevent Communit Dent* 5(5): 341-346.
4. Shalin Shah, Vijay B, Karthik V, Prashant C, M Ganesh, et al. (2013) Efficacy of silver diamine fluoride as an antibacterial as well as anti plaque agent compared to fluoride varnish and acidulated phosphate fluoride gel: An in vivo study. *Indian Journal of Dental Research* 24(5): 575-581.
5. Vinod B, Koppolu M, Nuvulla S, Thangala V, Redderu K (2012) Silver fluoride as endodontic medicament. *Contemporary Clinical Dentistry* 3(3): 262-264.
6. Alice Chen, Mary Cho, Sari Kichler, Jeffrey Lam, Anum Liaque, et al. (2012) Silver Diamine Fluoride: An Alternative to Topical Fluorides. *Journal of the Canadian Dental Association* 20(10):1-14.
7. Shalin S, Karthik V, Vijay Bhaskar, Ganesh M, Prashant C, et al. (2014) Silver Diamine Fluoride: A Review and Current Applications. *Journal of Advanced Oral Research* 5(1): 1-21.
8. MI Varnish™ with RECALDENT.
9. (2015) Enamel ProVarnish.
10. KJ Toumba, Al-Ibrahim, M E J Curzon (2009) A review of slow-release fluoride devices. *Eur Arch Paediatr Dent* 10(3): 175-182.
11. Juliano Pelim, Nahla Saleh, Marília Afonso R, Kyriacos Jack (2008) Slow-release fluoride devices: a literature review. *Journal of Applied Oral Sciences* 16(4): 238-246.
12. Roshni Dupare, Puneet Kumar, Arun Dupare, Romi Jain, Rajeev Chitguppi (2014) Intraoral Slow-Release Fluoride Devices. *International Journal of Preventive & Clinical Dental Research* 1(3):37-41.
13. Gordon Nikiforuk (1985) *Understanding Dental Caries*. S Karger Publisher, Germany.
14. (2015) Prophy pastes.