International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Systematic Review on Management of Dental Fluorosis

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ABSTRACT

Dental fluorosis is a specific condition caused by chronic ingestion of excess fluoride during tooth enamel formation. Cutting and removal of enamel proteins is prevented. Protein and water retention result in varying degrees of subsurface porosity that are related to the severity of fluorosis. Stomata attract external dirt and can cause enamel discoloration.Posteriorly, bite trauma can exfoliate superficial enamel, which is weakened by subsurface pores. Treatment management options include bleaching, microablation, veneering and crowning. Bleaching breaks down chromogens into smaller molecules, resulting in brighter, shiny teeth.While microabrasion aims to remove microporous zones on the surface along with trapped external stains. , laminate veneers and crowns provide aesthetic masking of stained fluorescent enamel. Mild to moderate fluorosis is recommended to be treated with microablation and bleaching, although some of the surface enamel is Severe fluorosis with loss of fluorosis is recommended to be treated with veneering and overcrowning depending on the degree of surface enamel loss. Long-term clinical studies are needed to assess sex.

Keywords: Fluorosis, Indices, bleaching, microabrasion, veneer

INTRODUCTION

Dental fluorosis is a specific disorder caused by chronic ingestion of excessive fluoride during the formative period of the dentition[1].Dental fluorosis is a common condition affecting both primary and secondary dentitions; however, the effects on secondary dentition are arguably more profound due to its permanency[2].In nature, fluorine is most frequently found in its fluoride form[3]. Some regions, such as Pakistan, China, and India, have water with relatively high naturally occurring fluoride amounts[4]. Excessive fluoride consumption has been linked to the emergence of pathological disorders, the severity of which depends on the timing, duration, and fluoride concentration of the exposure. Fluoride can cause a number of disorders to manifest, including fluoride toxicity, skeletal fluorosis, and dental fluorosis. Fluoride is most frequently ingested through drinking water[3]. Other sources include plants, which absorb fluorides from water in a similar way.Similarly, a lack of fluoride is linked to negative consequences, most notably an increased susceptibility to dental cavities[3].

Fluoride supplements, artificial water fluoridation, and topically applying fluoride-containing dentifrices directly to the mouth are all prophylactic treatments used to lower the risk of caries formation[5]. These actions may unintentionally result in a high intake of fluoride and perhaps result in tooth fluorosis. Dental fluorosis is now much more common in the US, where it is expected to affect 65% of children and adolescents between the ages of 12 and 15, with 30.4% of diagnoses falling into the moderate-to-severe category[6].

ETIOLOGY

The increased consumption of fluoride during tooth growth is the main cause of dental fluorosis. The length of time a person is exposed to excessive fluoride during the critical window of development, hereditary factors, and dose depend on how severe dental fluorosis is. [7] It is thought that excessive plasma fluoride prevents amelogenins from being eliminated during enamel maturation, which results in the development of hypomineralized enamel[8]. From birth to age 8, the important period for the onset of dental fluorosis in response to high fluoride ingestion[5]. This means that high fluoride intake outside of amelogenesis won't cause dental fluorosis. Dental fluorosis is connected with changes to the enamel that can be seen with water fluoride levels above 1.5 ppm[9]. Target fluoride levels in artificially fluoridated water are 1 ppm, which is expected to maximise fluoride's anti-cariogenic effects while lowering the danger of side effects including dental fluorosis[10].

Pathogenesis of Dental Fluorosis

Proteoglycans (PG) and glycosaminoglycans (GAG) are involved in the mineralization of bones and teeth[11]. Dermatan sulfate is present in fluorotic teeth and its presence disrupts the mineralization process and leaves decalcified deposits and this major factor is responsible for the disruption of calcium

phosphate deposition in the tooth. The interaction of the ground substance with the mineral phase is inhibited by fluoride and phosphate, but enhanced by calcium. Fluoride competes with binding sites for calcium and prevents GAG binding to hydroxyapatite. It follows that in vivo the presence of fluoride affects the interphase between the base substance and the frontal mineralization by the stear barrier[12].

Diagnosis of Dental Fluorosis

Long-term fluoride intake during enamel formation results in a continuum of clinical enamel changes, from fine white lines in the enamel to heavily chalky, opaque enamel that breaks down soon after eruption. The severity of the changes depends on the amount of fluoride received during the long period of tooth formation.

Examination History

A historic record of the patient's residence is important because it helps to have an idea of the level of fluoride present in the respective water sources. Any other fluoride history should also be determined.

Mild Fluorosis

The first sign of dental fluorosis appears as thin white streaks on the enamel surface. Fine, opaque lines follow the pericymata pattern and can only be distinguished after cleaning the surface of the tooth. Even at this stage of dental fluorosis, the cusps, initial margins, and marginal margins may appear completely opaque white, which has been referred to as the "snowcap phenomenon"[13].

Moderate Fluorosis

As the severity increases, distinct, irregular, opaque or cloudy white areas appear over the entire surface of the tooth. Lines of pericymata are often visible between these opacities.In the case of mild fluorosis, the disorders lead to porosity, and for some time after the eruption, the spots are caught and trapped in the enamel, making these areas more visible.

Severe Fluorosis

In a more severe form of fluorosis, the impact on the physical properties of enamel is more dramatic. A common consequence of this problem is that at various times after eruption, small areas of enamel are spontaneously lost, producing the appearance of enamel hypoplasia.

In severe stages, focal loss of the outer enamel occurs. Such enamel defects are usually referred to as "pipes". The fragments may vary in diameter and may occur scattered over the surface, although they are most commonly found along the incisal/occlusal half of the tooth. With increasing severity, these pits coalesce to form horizontal bands, and in more severely affected teeth, the confluence of the pitted areas creates larger "corroded" areas[14].

Finally, the most severely fluorotic tooth shows almost complete loss of surface enamel. Surface enamel loss may be so extensive that only a cervical margin of markedly opaque enamel remains intact. The remaining part of the tooth shows a dark brown discoloration[15].

Management

Patients may be oblivious or worried about the appearance of their teeth in cases of dental fluorosis that involve minor enamel alterations. As a result, no treatment might be required. As a result, when it comes to dental fluorosis, the patient's concerns are typically cosmetic[16]. When dental fluorosis is modest, vital dental bleaching might be a very efficient therapy option. The amount of hydrogen peroxide present differs between nations based on laws governing the highest doses of hydrogen peroxide allowed for teeth whitening[17]. The concentration used for dental bleaching performed in a dentist office is typically higher than the concentration given to patients for at-home whitening with bleaching trays. The healthy, unaffected tooth structure can be made lighter so that it can blend in with lighter fluorosed hypomineralized enamel, giving the tooth a more aesthetically pleasing appearance[16].

Enamel microabrasion and resin infiltration are two additional minimally invasive dental fluorosis treatments that can be used to treat mild to moderate occurrences of the condition. By manually removing the top layers of flurosed enamel, microabrasion can lessen the visibility of enamel discoloration[16]. When treating lesions that are deeper and more severely pigmented, this treatment may not be as effective.It has been demonstrated that combining tooth whitening and microabrasion can produce a more aesthetically pleasing outcome and assist get around this restriction. In order for low-viscosity resin to penetrate the enamel, hydrochloric acid must first be used to etch the enamel[18]. It is advised to isolate using a rubber dam[19]. This procedure has been demonstrated to successfully lessen the visibility of white patches and hence enhance cosmesis[16].Composite veneers are more tooth-conserving than traditional veneers since they call for little to no mechanical preparation of the native tooth[16].

Veneers or traditional crowns could be required in cases of extreme discolouration in order to provide the patient a result that is acceptable from a cosmetic standpoint. As composite and veneer restorations depend on effective enamel-resin bonding for retention, crowns may be the only long-term restorative option in patients with little or poor-quality enamel[20]. Patients must be thoroughly informed and make a decision based on the risks and advantages

before choosing more intrusive indirect restorative treatments like veneers and crowns, which start patients on the restorative cycle and require lifelong care. On sometimes, a mix of the available strategies is needed to accomplish an ideal result[16].

Bleaching

Discolored and slightly fluorescent teeth have been treated in the office or at home by bleaching or a combination of the two. Hydrogen peroxide (35%) and carbamide peroxide (10%) are widely used bleaching agents. Office bleach uses high-concentration (eg 35% hydrogen peroxide) bleaching gels.

Remove and clean your teeth before applying the gel directly to your teeth. The action of the gel can be accelerated using halogen or light emitting diode (LED) curing lamps. Multiple bleaching sessions in the office may be required to achieve the desired results. To facilitate penetration of the bleaching agent into the subsurface pores of the fluorinated teeth, the supermineralized surface layer can be conditioned with 37% phosphoric acid[22]. After bleaching at the office, you can bleach at home until you have the shade you want.

Microabrasion

Microabrasion is the controlled removal of surface stains from tooth enamel. This technique is used to remove mild to moderate fluorosis discoloration[23]. Microabrasion is often combined with bleaching to effectively remove fluorosis stains. It has been suggested to be the best treatment for mild fluorosis, but can also be tried for moderate fluorosis [21]. This technique is conservative and, if unsuccessful, more invasive treatment options can always be pursued.

Discolored teeth can be etched with phosphoric acid. A concentrated mixture of pumice stone and 18% hydrochloric acid is then used to polish the tooth surface. Microabrasion removes enamel pores along with trapped external patches. Low concentrations of hydrochloric acid are used in commercially available pastes. For example, the Prema microabrasion kit (Premier Dental) contains 15% hydrochloric acid with silicon carbide in an aqueous slurry, while Opalustre (Ultradent) is 6.6% hydrochloric acid combined with silicon carbide abrasive and silica gel as a binder. It has been constructed. The slurry is applied using a rubber cup at low speed (approximately 100 rpm)[23] or light pressure with a wooden tongue depressor[24]. In general, if the enamel discoloration is less than 0.2-0.3 mm, microabrasion is recommended[25]. Amorphous calcium phosphate (ACP) is applied to reduce tooth hypersensitivity after microwear[23]. Also note that a complex of casein phosphopeptides (CPP) and ACP may reduce the opaque white discoloration of enamel fluorosis by promoting remineralization.

Conclusion

Dental fluorosis is a developmental phenomenon due to excessive fluoride intake during dentinogenesis. Ingestion of water with a fluoride concentration up to 3 times higher than the recommended amount commonly leads to fluorosis. There is overwhelming evidence for the safety of low-concentration fluorides, but there is the potential for toxic overdose when high-concentration fluorides are used. The first symptom of fluoride overdose is enamel staining. Therefore, fluoride is considered a "double-edged sword". When used properly, fluoride is an ideal public health measure to prevent tooth decay. However, excessive intake of fluoride can have harmful effects on teeth and bones, leading to dental and skeletal fluorosis.

Due to the use of fluoride in preventive dentistry, the prevalence of mild to moderate dental fluorosis is increasing in most countries. Because mild fluorosis does not necessarily present an aesthetic problem in many communities, therapeutic intervention may not be necessary in many such cases.

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