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Mini Review

Dental Fluorosis: The Impact on Young Adults' Lives and Treatment Options

Seghir Arwa[1-3]*

[1]*Medical Intern at Faculty of Dentistry of Monastir, Tunisia*

[2]*Active Member in the Tunisian Association of Dental Students "TADS", Tunisia*

[3]*Fixed Prosthodontics Department, Medical Intern at Dentistry University Hospital of Monastir, Tunisia*

***Corresponding Author:** Seghir Arwa, Medical Intern at Faculty of Dentistry of Monastir, Tunisia.

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Abstract

Dental fluorosis is a cosmetic condition characterized by hypo mineralization of tooth enamel caused by ingestion of excessive fluoride during enamel formation. It generally appears as various degrees of tooth discoloration during growth. The severity of dental fluorosis depends on the dose administrated or ingested, age and the duration of the exposure. The most common form of fluorosis is characterized by small opaque white spots scattered over the tooth covering less than 25% of the surface. The severe form however is characterized by brown stains giving teeth a corroded-looking appearance where the discoloration is widespread. The purpose of this article is to study the impact of dental fluorosis on the psychological development of young individuals in addition to possible treatment plans.

Keywords: Dental Flurosis; Fluoride; Dean's Index; Treatment Options; Psychological Effect on Young Adults

Introduction

Fluorosis stains are the result of excessive intake of fluoride while teeth are still developing. Despite the fact that dental fluorosis physically damages the tooth, the real concern remains the aesthetic aspect of the smile. Most patients are concerned about what their teeth look like which is perfectly normal since the smile is the expression of the individual's personality.

Patients usually have a hard time comprehending how does this exposure to fluoride happen and how to prevent it. Fluoride exists naturally in water [1], if the natural fluoride levels becomes above the currently recommended range for drinking water, the risk of severe dental fluorosis increases. The CDC "Centers for Disease Control and prevention" [2] recommends that parents should give their children water from other sources if the natural levels of fluoride exceeds two parts per million. Prompted by concerns that children may be getting too much fluoride, the Health and Human Services Department in January 2011 lowered its recommended level of fluoride in drinking water. And the Environmental Protection Agency is reviewing its rules on the upper limit of fluoride levels in drinking water. On the other hand, fluoride supplements can be prescribed for children with high risk of tooth decay although the access to other sources of fluoride (like water supply) should be considered when trying to weigh the balance between developing tooth decay without the supplements and risking the appearance of dental fluorosis.

Once teeth are affected, a change of color appears as an early sign.

To determine the severity of fluorosis, the most affected teeth are examined and Dean's index is scored on the condition of these teeth [3]. Criteria for Dean's Classification System for Dental Fluorosis (1942).

Normal

Code 0

- Criteria -The enamel represents the usual translucent semivitriform type of structure. The surface is smooth, glossy and usually of pale creamy white color.

Questionable

Code 1

- Criteria - The enamel discloses slight aberrations from the translucency of normal enamel, ranging from a few white flecks to occasional white spots. This classification is utilized in those instances where a definite diagnosis is not warranted and a classification of 'normal' is not justified.

Very mild (10-25% of surface)

Code 2

- Criteria - Small, opaque, paper white areas scattered irregularly over the tooth but not involving as much as approximately 25 per cent of the tooth surface. Frequently included in this classification are teeth showing no more than about 1 - 2mm of white opacity at the tip of the summit of the cusps, of the bicuspids or second molars.

Mild (25-50% of surface)

Code 3

- Criteria - The white opaque areas in the enamel of the teeth are more extensive but do involve as much as 50 percent of the tooth.

Moderate (100% of surface)

Code 4

- Criteria - All enamel surfaces of the teeth are affected and surfaces subject to attrition show wear. Brown stain is frequently a disfiguring feature.

Severe (100% of surface)

Code 5

- Criteria - All enamel surfaces are affected and hypoplasia is so marked that the general form of the tooth may be damaged. The major diagnostic sign of this classification is discrete or confluent pitting. Brown stains are widespread and teeth often present a corroded-like appearance.

Treatment plans

Treatment options vary with severity. Depending on the score of fluorosis, the treatment plan could be different for each case. For example, patients who consult with simple white spots sometimes tend to suggest crowns or veneers without considering other treatment options thinking it is the only and best solution for them. Refusing or suggesting less invasive alternatives may lead to the patient's disappointment due to the lack of knowledge. This is where the true role of the cosmetic dentist comes; the patient needs simple explanation of the possible treatment options from the less invasive ones to the most invasive techniques.

[4] We cite

- **Enamel micro abrasion:** It is a minimally invasive technique that consists on removing almost to 0.2 mm of the enamel affected by the discoloration using acids and specific instruments. Enamel micro abrasion can improve the appearance of teeth by correcting imperfections like superficial stains, irregularities or spots related to fluorosis and other conditions. It is not always the right solution for all cases however it can also be used either prior to and/or after dental bleaching and along with veneers/crowns to achieve uniform tooth color.

- **Teeth bleaching:** It is a procedure that consists on lightening the natural color of the tooth using a solution basically composed of hydrogen peroxide. It also can be used prior to veneers/crowns to achieve better outcomes.

- **Composite bonding:** Before applying the composite, the surfaces of the tooth is roughened and then it is shaped, hardened and polished. Using multiple shades of dental composite can be useful to hide stains caused by fluorosis and to expect more natural results.

- **Veneers/Full crowns:** These are the highly invasive restoration techniques commonly used to improve or restore full function and aesthetic aspect of the tooth. It is normally indicated for severe cases of discolorations and other defects caused by dental fluorosis.

Discussions

[5] Over the past decades, there has been a significant decrease in average caries rate along with an increased prevalence of fluorosis. As a result, the use of fluoride became prudent to try and minimize dental fluorosis.

[5] In fact, numerous articles have reported that dental fluorosis is related to the prevalence and use of various fluoride sources including fluoride supplements, fluoride dentifrice and fluoridated water.

[6] Specific guidelines for different ages (Table 1) were published by the US Food and Nutrition Board of the Institute of Medicine in 1997, recommending total daily fluoride intakes. In this guideline, the suggested total daily exposure dosage for infants younger than 6 months of age of 0.01 mg fluoride/day in all drinks and food is lower than the USEPA recommended reference dose.

The proper amount of fluoride helps prevent and control tooth decay in children and adults. Fluoride works both while the teeth are developing and every day after the teeth have emerged through the gums. Fluoride consumed during tooth development can also result in a range of visible changes to the enamel surface of the tooth.

Age groups	Reference weight, kg (lb)	Adequate intake, mg/day	Tolerable upper intake, mg/day
Infants 0-6 months	7 (16)	0.01	0.7
Infants 7-12 months	9 (20)	0.5	0.9
Children 1-3 years	13 (29)	0.7	1.3
Children 4-8 years	22(48)	1.0	2.2
Children 9-13 years	40 (88)	2.0	10
Boys 14-18 years	64 (142)	3.0	10
Girls 14-18 years	57 (125)	3.0	10
Males ≥19 years	76 (166)	4.0	10
Females ≥19 years	61 (133)	3.0	10

Table 1 [7]**.**

*Dietary reference intakes for fluoride.

US National Academy of Sciences. Institute of Medicine. Food and Nutrition Board.

Dental fluorosis has a wide range of severity. Mild flurosis appears as white spots while more severe cases can be characterized by brown stains covering all surfaces associated with pitting of the enamel and a physical damage to the tooth.

In some cases, patients are embarrassed by the appearance of their teeth and they often admit that they're ashamed of their smile. These are usually young adults suffering from low self-esteem caused by dental fluorosis.

The psychological damage resulting from mild to severe fluorosis can be devastating and it could have negative effects on mental health.

Individuals diagnosed with dental fluorosis tend to hinder their smile and hide their teeth which affect their quality of life and their communication skills therefore threatening both personal and professional life.

Studies carried out by Oasis Dental Care [7] revealed that 4.4 million people confessed that "bad teeth" made them feel less confident in public.

[8] A mediocre oral hygiene is making 2.1 million (15%) feel depressed and is even stopping 400,000 (3%) from leaving their home, 1.4 million (10%) don't socialize as much as they would if they had a better looking smile and one million (7%) say their personal life has been negatively affected.

[8] Julian Perry, clinical director at Oasis Dental Care stated that: "The negative mental impacts of having bad teeth identified in our study go beyond vanity - some members of the public are demonstrating some very serious psychological issues, and we'd urge them to see a dentist".

Conclusion

Early diagnosis is crucial in preventing psychosocial complications and maintaining both mental and oral health.

Nowadays there is a greater appreciation of the importance of assessing the impact of fluorosis beyond just awareness, satisfaction and/or acceptability of this condition. Therefore, Dental Public Health and Paediatric Dentistry leaders should focus efforts primarily on the appropriate use of fluorides for caries prevention and preventing moderate/severe fluorosis.

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