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Oral Health wsr to Dental Fluorosis: A Review

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Abstract

Dental fluorosis occurs due to the hypo mineralization of tooth enamel. This can lead to discoloration of the teeth. Mild and very mild fluorosis can cause teeth to look whiter, and therefore, it can improve esthetic perceptions of teeth, thereby leading to better OHRQoL (Oral Health related quality of Life). On the other hand, moderate and severe fluorosis can cause more noticeable tooth discoloration and, in some cases, even loss of function, thus leading to decreased esthetic perception and poor OHRQoL. Therefore, depending on the severity of dental fluorosis, the OHRQoL of an individual can be shifted to either end of the spectrum.

Keywords: Dental fluorosis, Hypo mineralization, Tooth Enamel, Esthetic Perception and OHROoL.

INTRODUCTION

The extent of the public health problem posed by fluorosis and its impact on the quality of life depends largely on the fluoride level of water found in different geographic locations, as some places have high naturally occurring fluoride in drinking water and thus the prevalence of fluorosis in such places may be high, with esthetic concerns being more severe, especially if the fluoride content in drinking water is not optimized. Factors such as quantity and timing of fluoride intake are the primary determinants of dental fluorosis. Behavioural factors such as the duration that an infant is breastfed and dietary factors such as consumption of tea and fish with bones are some factors that have been shown to increase the risk of dental fluorosis by increasing the amount of fluoride intake. Although the primary determinants of dental fluorosis are quantity and timing of fluoride intake, the exact mechanisms that underlie dental fluorosis are unknown. Studies have shown that there is poor correlation between the tooth fluoride level and severity of dental fluorosis [1–4].

AIMS AND OBJECTIVES

The purpose of this study is to present an overview of importance of Oral health related quality of Life wsr to Dental Fluorosis.

CONCEPTUAL STUDY

It has also been shown that there is great variation in severity of fluorosis within a given category of estimated fluoride intake. These studies show that consumption of elevated levels of fluoride does not automatically result in dental fluorosis, there are gaps in our current understanding of the aetiology of dental fluorosis and there is a need for further research. Population based studies have shown differences in rates of fluorosis among different races that cannot be explained based solely on the amounts of fluoride consumption. There are some published studies that show that there is a genetic influence on fluorosis. However, most of these studies were done in animal models and extrapolation of these results to humans must be done with caution. Overall, these studies suggest that the genetic makeup of an individual can play a

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role in the aetiology of dental fluorosis and that dental fluorosis could be caused by interactions between specific genes and fluoride intake [5–7].

Dental Examination

Dental examinations for the IFS were carried out by one of the five trained and calibrated dentist examiners, with the help of portable equipment and halogen lights. Out of these five trained and calibrated examiners, only three did the 17-year-old time point dental examinations. The examiners assessed dental caries, non-fluoride opacities, dental fluorosis, and hypoplasia in all the participants.

Dental Fluorosis

The teeth were dried slightly with gauze and fluorosis was scored using the Fluorosis Risk Index, assessing four zones per tooth (occlusal tip/incisal edge, incisal third, middle third, and cervical third) on all teeth (personal communication with IFS staff). However, for the purpose of this study and for defining the variables, only the six anterior teeth and 4 zones per tooth were included in the statistical analyses, so there were 6×4 = 24 total surfaces. FRI scores are defined in Table 1.

Non-fluoride Opacities

For assessing non-fluoride opacities, separate tooth-level opacity scores were used to score the teeth, in addition to the dental fluorosis scoring. Table 2, as given below shows the non-fluoride opacity scoring used. Although FRI score 7 is used to score opacities in the Fluorosis Risk Index, however in FRI, fluorosis takes precedence if both fluorosis and opacities appear on the same tooth surface. Therefore, in this study, a more global opacity scoring was used, and separate tooth-level opacity scores were used to score the entire tooth.

DENTAL FLUOROSIS

Dental fluorosis was defined in two ways: (i) primary definition, and (ii) secondary definition. These have been explained below:

(i) Primary Fluorosis Definition

It was defined at the person level as having *one* or more maxillary anterior teeth with a FRI score of 2 or 3 for definitive fluorosis (assessing four zones, i.e., incisal edge, incisal third, middle third, and cervical third on each of the 6 maxillary anterior teeth).

Table 1. Definitive Fluorosis and Fluorosis Risk Index score definitions.

Definitive fluorosis	FRI score	Definition
No	0	No visible fluorosis on any zone, or
	1	Only white striations on less than half of each zone
Yes	2	Half or more of any zone exhibiting white striations, or
	3	Any zone with pitting, staining, or deformity

Note: *FRI score 7 is used to score opacities in the Fluorosis Risk Index. In FRI, fluorosis takes precedence if both fluorosis and opacities appear on the same tooth surface.*

Table 2. Non-fluoride opacity scoring and definitions.

Non-fluoride opacity score	Definition
0	No opacity
1	Non-fluoride opacity
2	Hypoplasia
3	Both non-fluoride opacity and hypoplasia
9	Unable to score

(ii) Secondary Fluorosis Definition

It was defined at the person level as having *two* or more maxillary anterior teeth with a FRI score of 2 or 3 for definitive fluorosis (assessing four zones, i.e., incisal edge, incisal third, middle third, and cervical third on each of the 6 maxillary anterior teeth). Fluorine is a chemical element with the symbol 'F' and atomic number 9 and is usually found in its ionic form. The use of fluoride has becoming increasingly common over the past few decades, due its efficacy in preventing dental caries. Although mild dental fluorosis is not a severe disease, moderate to severe forms of fluorosis can have serious cosmetic implications for affected people. In severe forms of the disease, the risk of dental caries increases. Due to the increased availability of fluorides from various sources, there has been an increase in the prevalence of dental fluorosis in the United States. This increase in prevalence makes it important for us to have a thorough understanding of the processes involved in the etiology of dental fluorosis. Recent studies have suggested a role for individual genes in the etiology of dental fluorosis. The data available from the Iowa Fluoride Study and Iowa Bone Development Study provided us with an opportunity to assess the role of genetics in the aetiology of dental fluorosis in terms of possible gene-environment interactions [8].

RESULT AND DISCUSSION

The prevalence rates of dental fluorosis are increasing in many countries, and there is an increase in skeletal fluorosis rates in India, China and countries in Africa, which make the identification of these genes very important [9]. Detection of such genes and gene-environment interactions can help in identifying biomarkers for dental fluorosis. This information can be used in modifying a person's fluoride exposure and there by alter an individual's risk of getting dental fluorosis in the future.

CONCLUSION

Based on the review of the studies that related OHRQoL to dental fluorosis, it can be conferred that severe dental fluorosis (TF score ≥ 3) has a negative impact on the OHRQoL of adolescents, while mild fluorosis (TF score = 1) actually may have a positive impact on their OHRQoL. Thus, it is a bigger concern in geographic locations with a high prevalence of severe fluorosis, as compared to places where only mild to moderate fluorosis is prevalent. But it still has an important public health implication for countries with prevalence of mild to moderate fluorosis, as they must maintain an optimum balance to benefit from the protective effect of fluoride. Fluoride acts a double-edged sword, as administering fluoride in the right proportion protects dental caries, (which in itself can negatively impact OHRQoL if untreated) but at the same time, over-use of fluoride (from various sources) may lead to severe fluorosis, which is an important esthetic concern and can impact the OHRQoL of an individual. Thus, prudent use of the various fluoride modalities is very important.

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