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Enamel Hypoplasia – A Case Presentation of A Disease Affecting Enamel of Teeth

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Abstract

Enamel hypoplasia is one manifestation of developmental enamel defects, which have been attributed to an increased likelihood of dental caries in the teeth that have become affected. The intent of this study was to employ Dean's fluorosis index to estimate the prevalence of enamel hypoplasia. A total of 100 individuals who had dental exams between the ages of 10 and 40 constituted the study sample. In accordance with the study's outcomes, the total number of individuals with mild fluorosis was most significant (58), then moderate (24), very mild (13) and least severe (5).

Keywords: Enamel Opacities, Dental Fluorosis, Dean's Fluorosis Index.

Introduction

The most frequent abnormality in tooth development and mineralization is enamel hypoplasia[1]. Defective mineralization and reduced tissue production could be a consequence of developmental pathway abnormalities[2]. Environmental alterations, including systemic diseases, hazardous chemicals, radiation, trauma, and epigenetic influences, can have an influence on the genetic control of enamel and dentin in the production process[3]. Enamel hypoplasia is a quantitative defect that results in decreased enamel thickness developed during the secretory stage of amelogenesis[2].

Hypoplastic or hypocalcified enamel sites may create an ideal local environment for adhesion and colonization of cariogenic bacteria, which can then remain at the base of

the defect in contact with exposed dentin. As a result, dental caries may spread rapidly in those areas[4]. Defective enamel is more susceptible to caries attack and has a higher acid solubility than normal enamel[2]. Varied indices and classification techniques have been implemented to track the different levels of dental fluorosis severity[3].

Enamel hypoplasia's aetiology

Enamel hypoplasia is caused by a number of acquired, inherited, systemic, and local aetiological reasons[4]. Because enamel does not reconstruct, imperfections theoretically constitute a record of the damage that the enamel organ endured during the process of developing the enamel. Nevertheless, because of the current inadequacy of understanding about the chronology of the various stages of amelogenesis and variations in rates of enamel development, establishing the exact point of trauma to the developing enamel is often challenging[5].

Clinical complications of enamel hypoplasia

As incisor teeth with enamel hypoplasia can have minimised aesthetics due to staining and alterations in morphology, people may feel anxious and self-conscious about their dental appearance. Furthermore, enamel hypomineralization and exposed dentin may result in more sensitivity in the teeth[3].

In the study conducted by Schroth et al., the primary risk factor for early childhood caries in the native communities of the Canadian province of Manitoba was the high prevalence rate of enamel hypoplasia, which was reported to be 50%[3]. These findings agreed with Mattee and colleagues' study, which found that enamel hypoplasia in Tanzanian infants contributed to more severe early childhood caries regardless of the absence of other risk factors like improper bottle feeding, use of sweetened pacifiers, and cariogenic diets, indicating that enamel defects have been a significant risk factor for early childhood caries. The teeth are more susceptible to wear due to the teeth's thinner, weaker hypoplastic or hypomineralized enamel in addition to dental cavities. Dental erosion and enamel hypoplasia have a high correlation, as reported by Kazoullis and colleagues[3]. Seow and Taji suggested that this is probably because hypomineralized teeth are more easily dissolved by ingested acids[4].

Material and Methods

Study population and data collection

It was an observational study that was conducted from August 2019 to January 2020 in the department of oral medicine and radiology at a dental school in India.

Sample selection

A total of 100 individuals with dental fluorosis between the ages of 10 and 40 were examined. Dean’s fluorosis index, which was used as a gold standard.

Examination of the dental fluorosis using Dean’s fluorosis index:

Before beginning the study, it was approved by the institutional ethics committee. A record was kept of the demographic information. For each patient where enamel hypoplasia was noted, photographs were taken. A mouth mirror and an explorer were used during the examination, which was carried out in the outpatient section in good lighting. All of the tooth surfaces for each tooth present were inspected for dental fluorosis while the field area was being recorded.

Demographic questionnaire

The patient's complete medical history was obtained. Questions with regard to drinking water sources, medication use, comorbidities for dental enamel defects (such as fluoride exposure, premature birth, falls on the front teeth, diabetes mellitus, prolonged periods of high fever, icterus, and antibiotic use), history of coeliac disease among family members, frequency of daily

brushing (none or irregular, 1 or more per day), and toothpaste used (whether it's fluoridated or non-fluoridated).

Oral examination

To determine the present condition of their dental health, each individual received a clinical examination. Before the examination, patients brushed their teeth to prepare them. One examiner made note of the clinical measurements. The teeth were dried by air using portable dental equipment, and any dental defects were then checked using a disposable mirror. According to Dean's fluorosis index, the classification for particular enamel defects was assessed. Furthermore, the oral examination included an evaluation of the dentition, including the number of teeth and carious teeth. At the tooth surface level, dental caries was identified. The mucosa of the tongue, lips, and palate, as well as other oral mucosal surfaces, were noted.

Statistical analysis

All of the data was put forward on a custom proforma and analysed by percentage.

Dean's Index (DI) (Dean, 1934)[9]

Dean evaluated the enamel's clinical appearance, which ranged from normal to severe.

Table 1:

Normal	Enamel that is glossy, smooth, and translucent
Very mild	Veining-refers to small, opaque, paper-white spots or streaks that cover less than 25% of the tooth's surface
Mild	On the buccal and labial surfaces of teeth, there are irregularly shaped, paper-white regions with small, opaque spots.
Moderate	Pitting on the labial and buccal surfaces, inclusion of the complete tooth surface, and a brownish shade
Severe	brown staining and mottling on all tooth surfaces

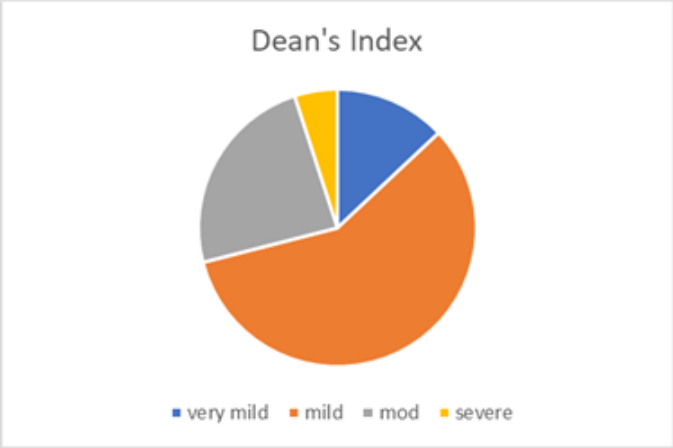
Results

A total of 100 patients aged 10–40 years were evaluated in the present study. 70% of the patients had no knowledge regarding the aetiology of dental fluorosis.

Table 2:

Dean's Index	No of patients
very mild	13
mild	58
Moderate	24
severe	05
Total	100

Graph 1:



According to our findings, patients with a mild Dean's fluorosis index exhibited the highest frequency, followed by those with a moderate, mild, and least common severe Dean's fluorosis index.

According to Dean's index, the teeth affected in the moderate and severe categories were in the following order:

premolars > molars > canines > incisors, whereas in the very mild and mild categories, the order was incisors > molars > premolars.

Figure 1: White chalky opacities & brownish discoloration presents along with pitting on labial Aspect

Figure 2: White chalky opacities, pitting present on labial aspect & notching in incisal aspect with upper incisors

Discussion

The present study was carried out in a district in India, as we often see patients with fluorosis in our outpatient department. The severity of dental fluorosis evaluated as per Dean's index was in the range of very mild to severe levels in selected patients. Mild Dean's fluorosis index patients were 58 out of 100, i.e., with the highest frequency, followed by moderate 24 out of 100, very mild with 13 patients, and least common with severe Dean's fluorosis index with 5 patients. This could be possible because of the low fluoride level of the water.

In the course of this study, it came out that the incisors and canines in the two arches were less damaged than the premolars and molars. The rate at which the teeth calcify may be an explanation for this. In comparison to premolars and second molars (18–36 months of age), the incisors and canines begin to calcify at an early stage of 4-5 months. Compared to the premolars, these teeth are consequently only affected by mild and very mild forms of dental fluorosis. Premolars and molars were the teeth that were most severely affected by dental fluorosis, in accordance with Pereira and Moreira's study [8], which also revealed a similar pattern of severity across different teeth[8].

The severity of dental fluorosis evaluated as per Dean's index in selected patients has been found to be associated with dental caries. These results were similar to those reported earlier by others (8): an increase in fluoride in drinking water showed a corresponding increase in the severity of dental fluorosis, according to Dean's index. Therefore, this study indicates that enamel hypoplasia is a significant predictor of dental caries. The study does have several limitations, though, which need to be acknowledged. The within-subject effect of enamel hypoplasia was not consistently significant, and the research did not take into account a number of crucial parameters related to dental caries, such as oral bacteria and plaque levels. This may imply that all teeth in individuals with enamel hypoplasia are equally at risk of acquiring caries. In addition, the minor effects of hypoplasia on caries increments may suggest that the condition has a more significant early impact but that it does not necessarily continue to put patients at a greater risk of developing caries for many years after eruption.

Most of the patients in these areas brushed their teeth using fluoride toothpaste. Fluoride dentifrices have a substantial topical effect on enamel, preventing dental caries by creating a reservoir in the tooth plaque. This prevents the demineralized or fluorosed enamel from further degrading.

Although Dean's index is not an accurate criterion for the assessment of the severity of dental fluorosis, it is still considered a gold standard. Alternative indices, such as the TSIF and ICMR, may be used to differentiate the different grades of dental fluorosis more objectively. The TSIF index (1984), on the other hand, is a clinical index with more specific criteria that is unsuitable for field studies. The ICMR index measures the actual severity of dental fluorosis compared to Dean's index, which overestimates the severity of dental fluorosis[3].

Fluorosis is a problem that should be assessed regularly because it is an indication of the level of fluoride exposure during enamel production. When there is a substantial amount of fluorosis in a community, measures should be carried out to prevent fluoride usage by young children who have developing teeth.

References

1. Kumar N, Gauba K, Goyal A, Kapur A. Comparative evaluation of three different recording criteria of dental fluorosis in a known endemic fluoride area of Haryana. The Indian Journal of Medical Research. 2018 Jun;147(6):567.
2. Salanitri S, Seow WK. Developmental enamel defects in the primary dentition: aetiology and clinical management. Australian dental journal. 2013 Jun;58(2):133-40.
3. Hong L, Levy SM, Warren JJ, Broffitt B. Association between enamel hypoplasia and dental caries in primary second molars: a cohort study. Caries Research. 2009;43(5):345-53.
4. Nikiforuk G, Fraser D. The etiology of enamel hypoplasia: a unifying concept. The Journal of pediatrics. 1981 Jun 1;98(6):888-93.
5. BIÇAK DA, Urganci N, AKYÜZ S, Merve US, Kizilkan NU, Burçin AL, Yarat A. Clinical evaluation of dental enamel defects and oral findings in coeliac children. European Oral Research. 2018 Sep;52(3):150-6.
6. Kanchan T, Machado M, Rao A, Krishan K, Garg AK. Enamel hypoplasia and its role in identification of individuals: A review of literature. Indian Journal of Dentistry. 2015 Apr;6(2):99.
7. Aine L. Dental enamel defects and dental maturity in children and adolescents with coeliac disease. Proc Finn Dent Soc 1986; 82: 1-7.
8. Fonseca RB, Sobrinho LC, Neto AJ, Mota AS, Soares CJ. Enamel hypoplasia or amelogenesis imperfecta-a restorative approach. Brazilian Journal of Oral Sciences. 2006;5(16):941-3.
9. Nor NA. Methods and indices in measuring fluorosis: A review. Archives of Orofacial Sciences. 2017:77-85.
10. Gopalakrishnan P, Vasan RS, Sarma PS, Ravindran Nair KS, Thankappan KR. Prevalence of dental fluorosis and associated risk factors in Allappuzha district, Kerala. National Medical Journal of India. 1999 May 1;12:99-102.
11. Rajendran R. Shafer's textbook of oral pathology. Elsevier India; 2009.
12. Neville BW, Damm DD, Allen CM, Chi AC. Oral and maxillofacial pathology. Elsevier Health Sciences; 2015 May 13.
13. Goyal A, Verma M, Toteja GS, Gauba K, Mohanty V, Mohanty U, Kaur R. Validation of ICMR index for identification of dental fluorosis in epidemiological studies. The Indian Journal of Medical Research. 2016 Jul;144(1):52.
14. Freiman A, Borsuk D, Barankin B, Sperber GH, Krafchik B. Dental manifestations of dermatologic conditions. Journal of the American Academy of Dermatology. 2009 Feb 1;60(2):289-98.

15. Scardina GA, Messina P. Good oral health and diet. Journal of Biomedicine and Biotechnology. 2012 Jan 1;2012.
16. Thakur M. Familial Vitamin D-dependent rickets Type 2A: A report of two cases with alopecia and oral manifestations. Journal of oral and maxillofacial pathology: JOMFP. 2019 Feb;23(Suppl 1):130.
17. Crawford PJ, Aldred M, Bloch-Zupan A. Amelogenesis imperfecta. Orphanet journal of rare diseases. 2007 Dec;2(1):1-1.