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Assessment of Enamel Defects in Patients Visiting Saveetha Dental College, Chennai: A Pilot Study.

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ABSTRACT

Defects in the enamel are of utmost clinical significance since they are responsible for aesthetic problems, dental sensitivity, dento-facial anomalies, as well as for a predisposition to dental caries. The purpose of this study was to assess the presentations of enamel defects in outpatients who visited Saveetha Dental College, Chennai over a period of 2 months. A total of 450 healthy outpatients who visited Saveetha Dental College, Chennai during a period of 2 months were examined using modified Developmental Defects of Enamel (DDE) index criteria for recording enamel defects. The prevalence of enamel defects was 22.2%. Diffused opacities was the most common defects found of 42%, followed by hypoplasia (38%) and demarcated opacities (18%). The most affected teeth were the upper incisors (18%) with the least defects found in the lower anterior (9%). Defects were observed more frequently in the upper arch (14%). Assessing enamel hypoplasia separately, prevalence of 38% was observed, with the most affected teeth being the upper incisors (11%). The average number of enamel defects were higher for females (23%) when compared to males (21%). These defects are to be acknowledged at the paediatric age and treated as there are no available treatment modalities other than veneers or bleaching for generalised discolouration and also that aesthetics is a major social concern in the present scenario.

Keywords: Hypoplasia, Enamel, Opacities

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INTRODUCTION

Defects in the enamel are of utmost clinical significance since they are responsible for aesthetic problems, dental tooth sensitivity, dento-facial anomalies, as well as for a predilection to dental caries.[1] There are only a few epidemiological studies on the prevalence of enamel defects in the permanent dentition when compared to that of the deciduous dentition.Local causes such as trauma, pulpal exposure, radiation exposure, cleft lip and palate, burns, osteomyelitis, jaw fractures and hypothyroidism, bacterial and viral infections, renal disorders, vitamin D deficiency and congenital heart diseases are said to be some of the aetiology for enamel defects[2].When only one or few adjacent teeth exhibit an enamel defect, it is usually considered to be caused by a very localized factor, Generalized enamel defects are those defects that are seen either on the crowns of groups of teeth or in all the teeth.Amelogenesis-imperfecta (AI) is a heterogeneous group of genetic disorders that affects the development of dental enamel[3].Environmental agents such as lead, mercury, bisphenol A (an endocrine-disrupting chemical), some drugs such as anticancer agents and tetracycline and some trace elements including fluoride andstrontium have been implicated. Exposure to such substances during amelogenesis may resultin the formation of defective enamel depending on the stage of enamel development,the timing of exposure, the length of exposure and the underlying health ofthe individual. [4]Enamel defects can be classified clinically as demarcated, diffuse opacitiesand hypoplasia. The location of isolated defects rest onthe stage of amelogenesisat the time of the insult or injury [5]. The general consensus regarding the aetiologyof isolated opacities, which may be demarcated or diffuse and exist as white,creamy, or yellow in colour, is that amelogenesis is affected by a disturbance duringthe mineralization phase. [6]Conversely, hypoplasia occurs when there is a disturbance during the secretary stage of amelogenesis while the enamel is only partly mineralized. Thus, enamel defects with similar presentationsmay have been caused by a variety of etiological factors. Furthermore, the same etiological factor can produce enamel defects with different presentations depending on the timing of the insult. The purpose of this study is to emphasise the clinical significance of enamel defects and that early diagnosis will be beneficial to the mental and social well-being of a patient.

MATERIALS AND METHODS

The study was based on clinical examination of 450 Indian patients (289 males,161 females) who visited the outpatient clinic of Saveetha Dental College, Chennai during a period of 2 months. A comprehensive clinical examination was carried out to identify the presence of enamel defects and its variants after obtaining proper informed consent from all. The patient's demographic details such as age, sex, locality, diet, usage of fluoridated tooth paste was obtained. The examination was carried out under natural light setting and the tooth surfaces were completely dried prior to the examination. Flat mouth mirrors and periodontal probes were used for the examination. Patients were grouped into 4 age strata, group I aged 11 to 20 years, group II aged 21 to 30 years, group III aged 31 to 40 and group IV aged 41 to 50.

A modified developmental defects of enamel (DDE) index was used for charting enamel defects. An opacity was recorded if there was a change in the translucency of the enamel but only if the enamel was of normal thickness with a smooth surface that could not be scraped or penetrated by an explorer. Opacities were white, yellow, cream, or brown in colour. They were classified as:

1. Demarcated, if the defect had a discrete and clear boundary with the adjacent normal enamel; and
2. Diffuse, if the defect had no clear boundary with the contiguous normal enamel.
3. Enamel hypoplasia was recorded if there was a quantitative loss of enamel or break in either the enamel surface or in the form of pits, grooves, or other malformations.

Exclusion criteria of the subjects included patients with any significant medical history, patient belonging to the paediatric age group (under the age of 11 years), patients undergoing orthodontic treatment, wearing full veneer crowns and or fixed partial dentures were excluded. A tooth was considered present when any portion of the crown had erupted through the mucosa.

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RESULTS

There were no refusals to participate in the study. The permanentdentition of 289 males and 161 females aged 11 to 50 were examined. Patients were grouped into 4 age groups, group I aged 11 to 20 years, group II aged 21 to 30 years, group III aged 31 to 40 and group IV aged 41 to 50. [Table 1]

Table 1: Distribution of sample according to age and gender

AGE, years	MALE	FEMALE	TOTAL (%)
GROPU I- 11 TO 20	98(21%)	41(9%)	139(30%)
GROUP II- 21 TO 30	101(22%)	50(10.9%)	151(34%)
GRUOUP III- 31 TO 40	53(11%)	44(9.7%)	97(22%)
GROUP IV- 41 TO 50	37(8.2%)	26(5.7%)	63(14%)
TOTAL (%)	52(11%)	38(8.4%)	**450**

The prevalence of enamel defects observed was 22.2%. The tooth most affected by defects were the upper incisors(18%) followed by upper canines (16%), lower molars (11%). The least affected teeth were lower incisors (9%). Defects were observed with greater frequency in the upper arch (14%) than in the lower arch (12.8%). [Figure 2 and Figure 3]

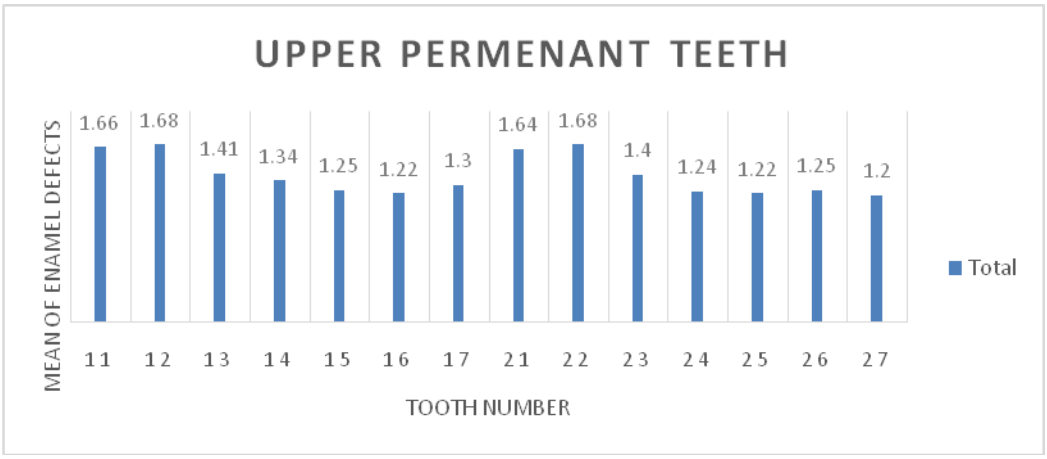

Figure 2: Proportion distribution of tooth affected by enamel defects

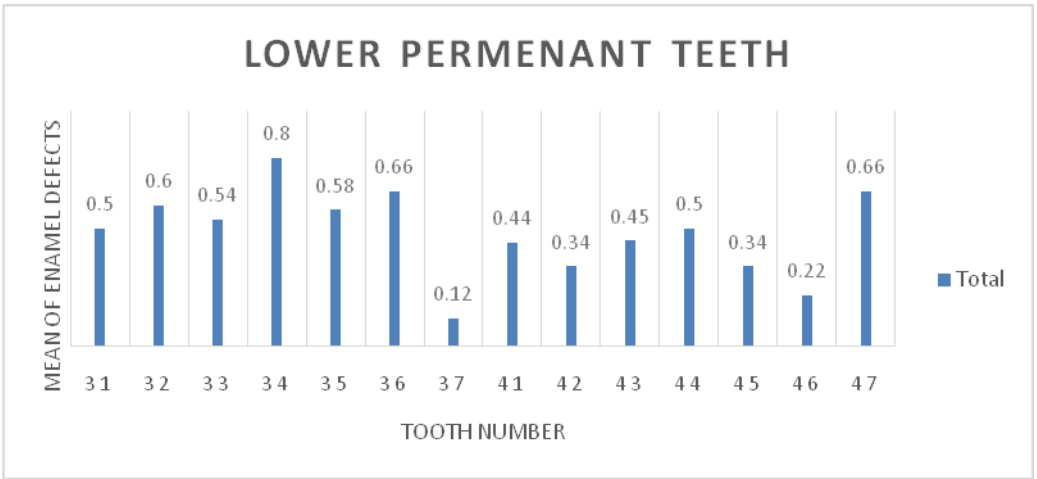

Figure 3: Proportion distribution of tooth affected by enamel defects

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Of the 100 cases with positive findings of enamel defects about 26% cases should generalized defects being having all their teeth affected and 73% with localized enamel defects. Hypoplasia lesions were just as likely to occur on the left side as they were on the right side of the mouth.

Analysing specifically enamel hypoplasia, a prevalence of 38% was noted, the teeth most affected by hypoplasia was upper incisors (11%) followed by upper canines (10%), lower premolars (6%) and least affected was the upper second molars (4%). Hypoplasia was more significant in the upper (52%) than in the lower arch (48%), but the difference was not significant.[Figure 4 and Figure 5]

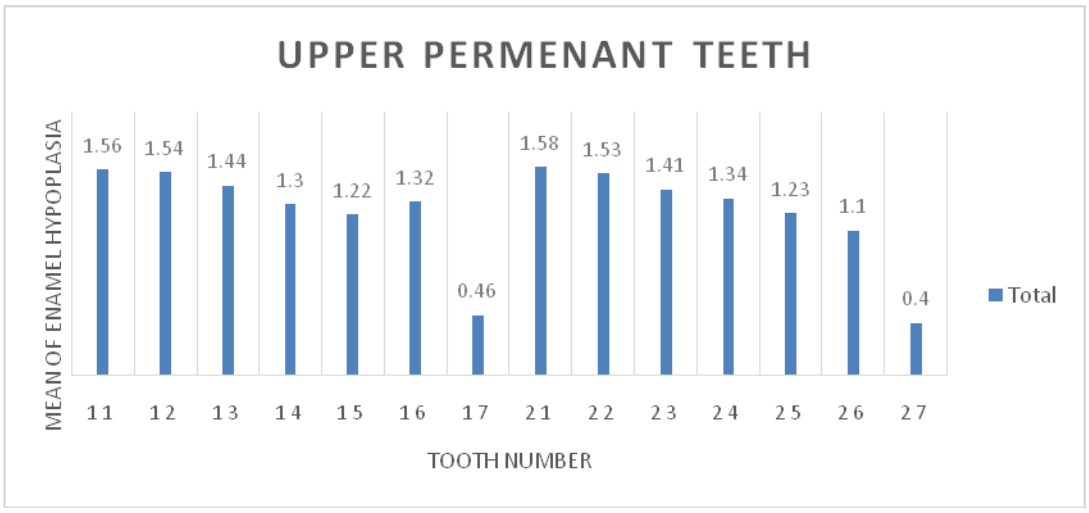

Figure 4: Proportion distribution of tooth affected by enamel hypoplasia

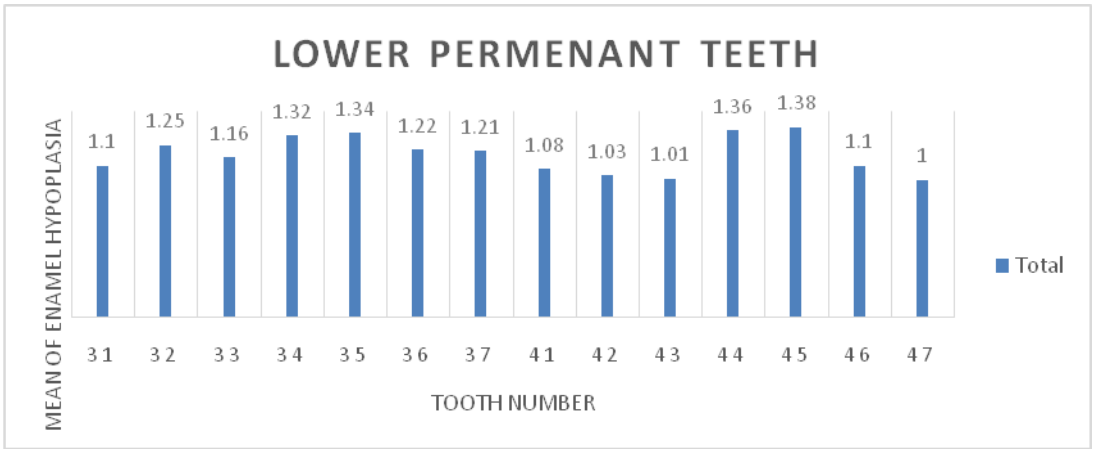

Figure 5: Proportion distribution of tooth affected by enamel hypoplasia

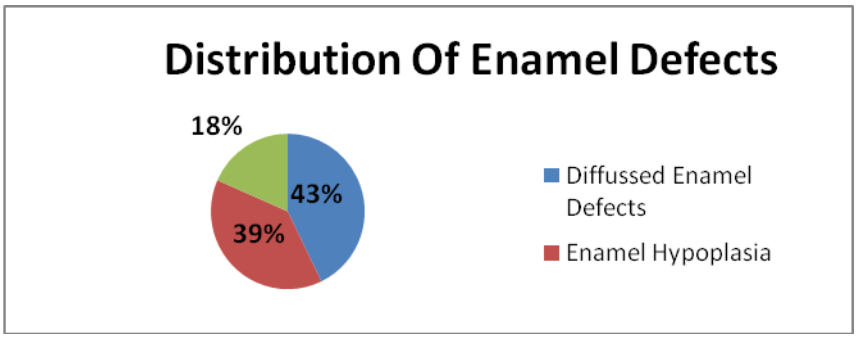

Figure 1: distribution of enamel defects

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Of the total of 12600 tooth examined 1770 teeth (14%) exhibited enamel defects. [Figure1] Distribution based on type of enamel defects showed, Diffuse opacities were the most frequently found 764 (42%), followed by hypoplasia 665 (38%) and demarcated opacities 321 (18%), followed by combined defects in only 2% of cases. [Figure 6]About 7% of the cases showed generalised enamel defects which was due to Enamel Hypoplasia such as amelogenesis imperfecta, [Figure 7] whereas localised enamel defects were 10.8% and which were due to turners hypoplasia.

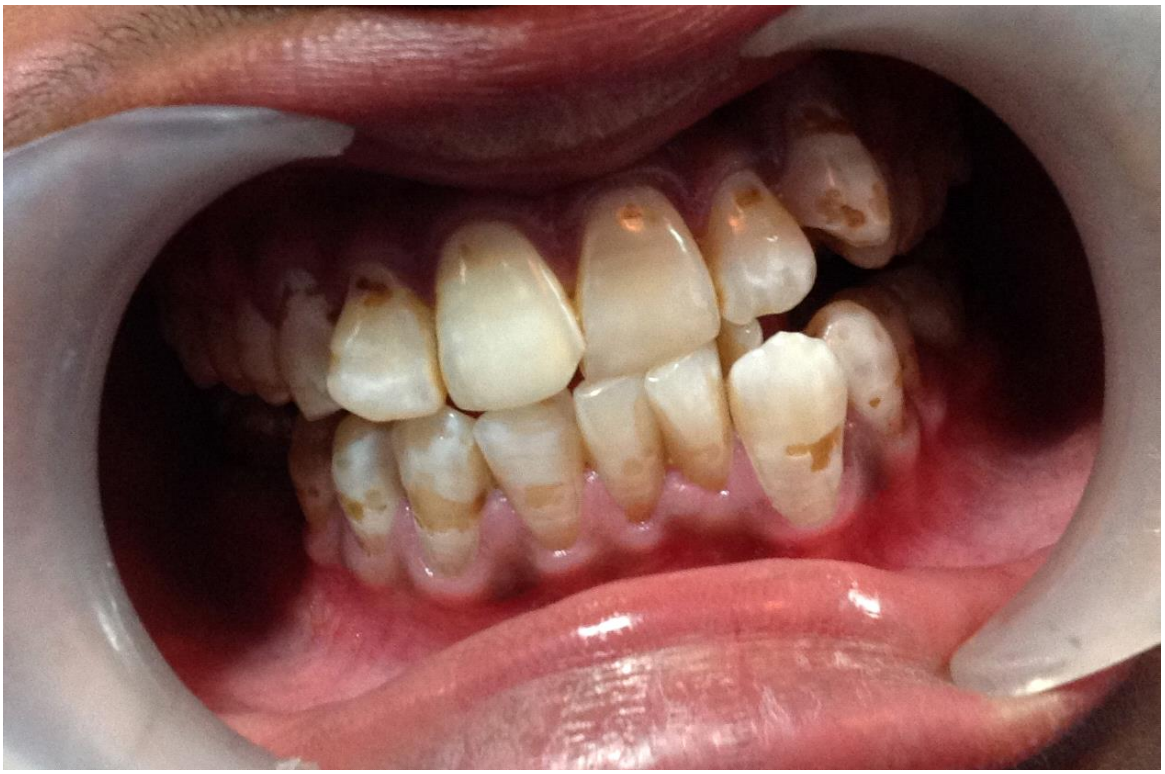

Figure 6: Condition which reveals a combination of opacities, enamel hypoplasia with demarcated opacities.

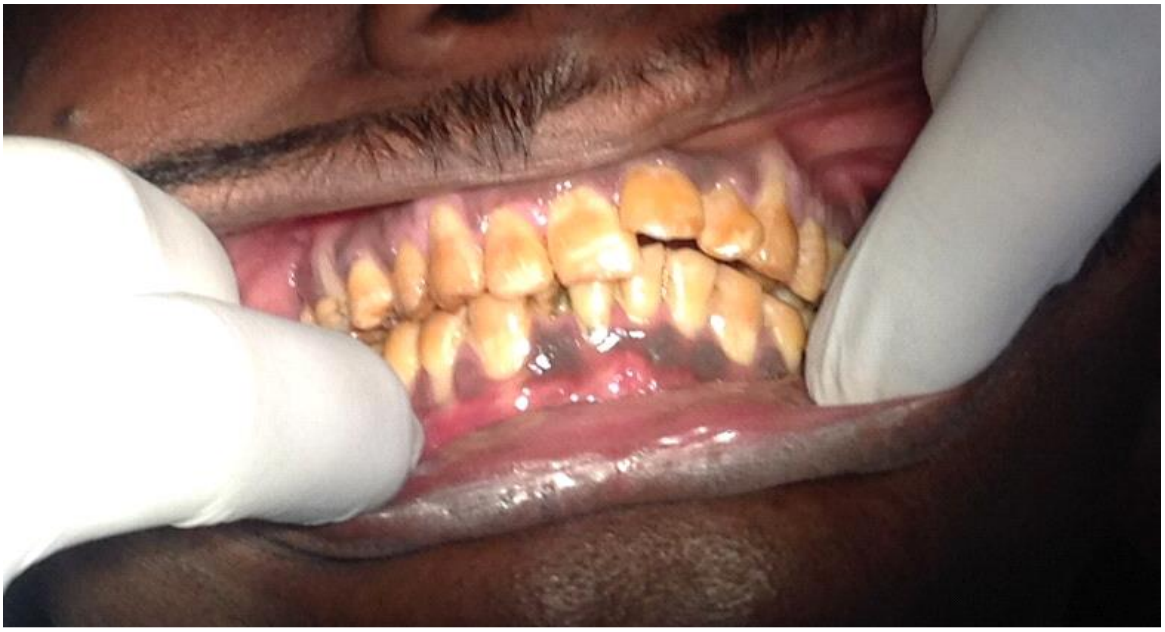

Figure 7: Reveals a condition which shows generalised diffused yellowish discolouration due to amelogenesis imperfecta.

The average number of enamel defects were higher for females (23%) when compared to males (21%).

Most of patients were aware about the discolouration and opacities which was of their aesthetic concern, majority of them also confessed that their primary dentition also had similar findings and were not aware about the treatment options available. Patients were also conscious that this condition was localized to particular geographic areas and that they noticed similar findings in their neighbourhood and in their families, but were not aware about the reason why this condition was prevailing.

DISSCUSSION

Although the aetiology of enamel defects may be attributed to local, systemic, genetic, or environmental factors, most are likely to be multifactorial in nature. This makes it difficult to identify a single cause for many cases of DDE. Enamel morphogenesis is a continuous, complex process that starts with the secretion of enamel matrix proteins followed by mineralization and finally maturation. The time frame of exposure and the mechanism underpinning the causative factors determine the presentation of these defects. Comparison of findings in this study with those in other similar studies must be done with caution because of the differences in population, environmental conditions and methods of reporting.

In the present study 38% of the population had enamel hypoplasia, which is near to the chapples[7] study with 23% and daneshkazemi [8]with 32 , but it does not compare to 10% in weerheigan [9], 46% in goodman [10], 68% in brook [11], 76.4% in majid [12]. Possible explanations for this discrepancy are attributed to the differences in geographical region and the amount of fluoride in the population's drinking water.

The majority of defects were located on anterior teeth, which was consistent with the goodman [10] level and Montero [13] studies. The reason for enamel hypoplasia being more prevalent in anterior teeth may be due to vulnerability of anterior tooth germs to trauma during tooth development, these results are in contradictory with the studies conducted by kellerhof [14] , majid [12]andekanayake [15]who found the prevalence of enamel hypoplasia in posterior teeth.

Among the three types of defects examined, diffused opacities were the most frequently found (42%), which is similar to the study done by weeks et al[16]. The reason of these high rates could suggest that most of the patients were from the areas which have higher exposure to fluoridated water predisposing to dental fluorosis, which is responsible for the diffused spread of enamel defects.Localised enamel defects are more common in relation to turners hypoplasia (10.8%). Amelogenesis imperfecta are a heterogeneous group of genetic disorders that affects the development of dental enamel[3]and have contributed to 7% of the cases which showed generalised enamel defects.

Defects such as enamel hypoplasia and isolated enamel opacities occur as a results of disruptions in enamel development. A variety of genetics factors along with environmental factors have shown to contribute to these defects, including mechanical trauma, racial background and lack of prenatal care. The purpose of this study is to emphasise the clinical significance of enamel defects and that early diagnosis will be beneficial to the mental and social well-being of a patient.

CONCLUSION

Defects in the enamel are of utmost clinical significance since they are responsible for aesthetic problems, dental sensitivity, dento-facial anomalies, as well as for a predisposition to dental caries. Among 450 healthy outpatients examined, enamel hypoplasia rates were 38%; the permanent tooth types most commonly affected with enamel defects were maxillary incisors (18%); Enamel hypoplasia was more common in maxillary incisors (11%) than on mandibular incisors; Enamel defects were more common in males than females. This implies that there is a neglect in awareness of such defects in the paediatric population that causes permanent dentition discoloration and hypoplasia. Hence these defects are to be acknowledged at the paediatric age and treated as there are no available treatment modalities other than veneers or bleaching for generalised discolouration and also that aesthetics is a major social concern in the present scenario.

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