

Assessment of the oral health status and association between developmental defects of enamel (DDE) and dental caries among 5 years, 12 years and 15 years old school children in Panvel Taluka, Raigad District, Maharashtra

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Abstract

Aim: To assess the oral health status and association between Developmental Defects of Enamel and dental caries among 5 years, 12 years and 15 years old school children -A Cross sectional survey.

Methodology: Two schools were selected randomly from list of schools procured from block education officer, Raigad District. Total 815 children of 5, 12 and 15 years age were examined. Data was recorded on customized proforma. It included assessment of dental caries, gingival status, malocclusion and DDE. Statistical test used was Pearson’s correlation test. p value<0.05 was considered significant.

Results: Prevalence of caries was 68.76%, 67.63%, 68% at ages 5, 12, 15 years resp. Prevalence of malocclusion was 28%, 36%, 24.24% at ages 5, 12, 15 years resp. Prevalence of bleeding on probing was 13%, 17.92% and 31.52% at ages 5, 12 and 15 years resp. Prevalence of DDE was 8%, 9.70%, 11.20% at ages 5, 12, 15 years respectively. Demarcated opacities (5.28%) were the most common followed by Diffuse opacities (2.45%). Prevalence of hypoplasia was the least (1.96%). Prevalence of caries in children with opacities and hypoplasia was 58.73% and 87.50% resp. Significant

association was found between DDE and caries with p value < 0.05 and r=0.6.

Conclusion: Dental caries was the most common oral health problem among all age groups. Malocclusion was more common among 12 years old children which may be because of mixed dentition. Gingivitis was most common among 15 years old children. There was statistically significant association between DDE and dental caries.

Keywords: DDE, Dental caries, Gingivitis, Malocclusion.

Introduction:

Oral health is an integral part of general health and has a direct impact on general health¹. Children who suffer from poor oral health are 12 times more likely to have restricted activity days than those who do not¹. Untreated oral diseases in children frequently lead to serious general health problems, significant pain, interference with eating, and lost school time². Dental caries is the most prevalent dental affliction of childhood. According to the national oral health survey, dental caries prevalence in India was 51.9, 53.8, and 63.1% at ages 5, 12, and 15 years, respectively².

Enamel is a unique mineralized tissue is its method of development, structure and chemical nature. Mature enamel, containing very little organic matrix, is the most highly mineralized and the hardest tissue in the body. Enamel is so stable that it can resist heavy occlusal forces and various noxious chemicals. However, enamel is not without its weaknesses. Developmental defects of enamel (DDE) present a wide range of features. The defects may affect a circumscribed area of one surface of the enamel or, at the other extreme; they may be widespread, affecting all surfaces of the enamel throughout its full thickness. Enamel Hypoplasia may be due to disruption in the process of enamel matrix formation, which in turn causes defect in quality and thickness of enamel. Recent studies indicate that 3-15% of children show signs of

enamel hypoplasia³. A large number of causes have been described for enamel defects, both environmental and genetic. Enamel hypoplasia may be inherited as primary defects of enamel or may be acquired, as a result, of childhood medical problems such as infections, metabolic derangements, premature birth and nutritional disorders. The abnormal discoloration and tooth morphology associated with enamel hypoplasia may compromise esthetics and predispose the affected teeth to dental caries. In order to assess the magnitude of the preventive task, it is necessary to know the extent and severity of the disease. Schools are the best center for effectively implementing any comprehensive health care program as children are easily accessible at school and they represent a larger population. Hence the current study was planned to provide the base line data regarding oral health status and to find out the strength of association between developmental enamel defects and caries.

Materials and methods:

This survey was a cross sectional survey. The study duration was 2 weeks. Ethical clearance was obtained from Institutional Ethics Recognition Committee of MGM Dental College and Hospital.

The list of all the schools in the Panvel taluka was obtained from Block education officer of Raigad District. Aided English medium private schools were selected. Two schools were selected randomly by simple random sampling using lottery method. The official permission was obtained from the concerned school authorities to implement the survey. All the 5 years, 12 years and 15 years old children from these schools fulfilling the inclusion criteria and with parents' consent obtained, were included in the survey.

Inclusion criteria

1. Children aged 5 years, 12 years and 15 years of both the sexes and willing to participate.
2. Children with at least 20 teeth in their mouth.

Exclusion criteria:

1. Children undergoing orthodontic treatment.
2. Children with dental fluorosis.
3. Children not reported to school on the day of survey.

Sample size was calculated based on the findings of previous study by considering Confidence interval: 95% and 10% of variability. The minimum required sample size was estimated to be 322. Total of 815 school children were examined.

Two trained examiners carried out the oral health examination using WHO oral health survey form. It included an assessment of dental caries (dentition status index), gingival status (Bleeding on probing component of CPI), malocclusion (DAI index), developmental enamel defects (was recorded based on WHO codes and criteria). While examination of DDE, any gross plaque or food deposits were removed, and the teeth were examined in a wet condition. Developmental defects of enamel were differentiated from incipient caries.

Clinical examination was done under natural light by means of sterilized mouth mirror and a periodontal probe (Type III Dental Examination Method). After oral examination, all the students were informed about their oral health status and treatment required if any. At the end, oral health education session was carried out for all school children.

The prevalence of dental caries, malocclusion, gingivitis and developmental defects of enamel was reported in terms of percentages. The data was coded and analyzed using the SPSS version 24.0. Association between the developmental defects of enamel and dental caries was tested by using Pearson's correlation

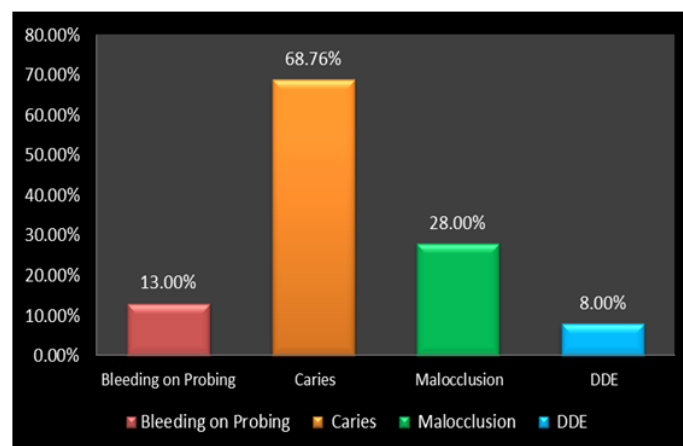
test. The p value was calculated and the level of statistical significance was kept at $p < 0.05$.

Results

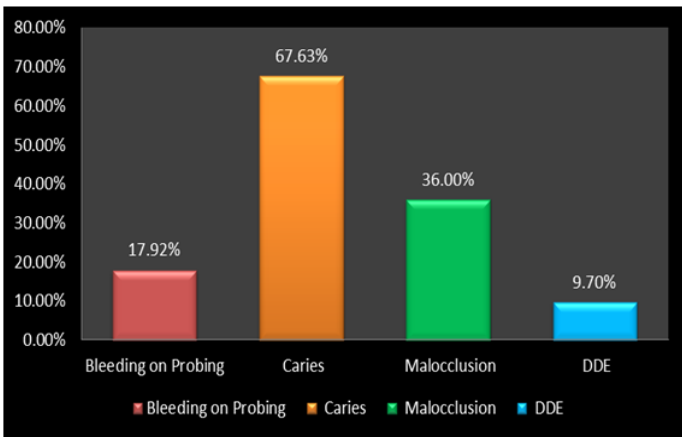
Out of the total study population, 32% were 5 years old, 33.7% were 12 years old, and 34% were 15 years old. In the 5 years old group, there were 144 males (55.2%) and 117 (44.8%) were females. In the 12 years old group, there were 139 males (50.5) and 136 females (49.5). In the 15 years old group, there were 140 males (50.2%) and 139 females (49.8%). [Table 1]

Sex	Male		Female		Total
	N	%	N	%	
5 Years	144	55.17	117	44.83	261
12 Years	139	50.55	136	49.45	275
15 Years	140	50.18	139	49.82	279
Total	423	51.90	392	48.10	815

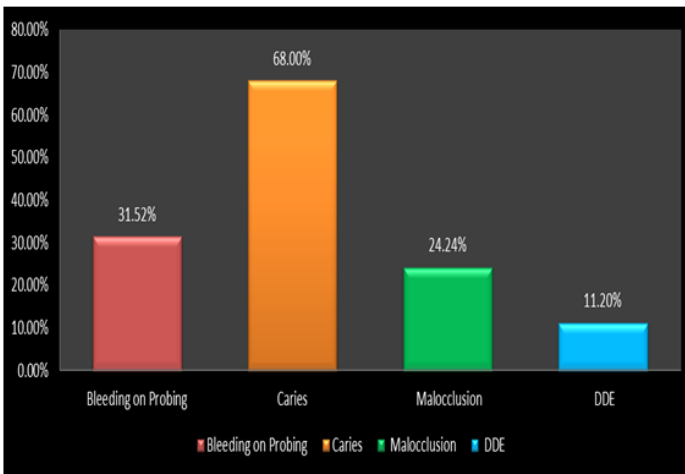
13%, 17.9%, 31.5% of the 5 years, 12 years and 15 years old group respectively showed bleeding on probing. The prevalence of malocclusion was 28%, 36% and 24.24% in 5-, 12- and 15-years old group respectively. The prevalence of caries was 68.76%, 67.6% and 68% in 5-, 12- and 15-years old group respectively. The prevalence of DDE was 8%, 9.7% and 11.2% in 5-, 12- and 15-years old group respectively. [Graph 1, 2, and 3]



Graph 1: Oral health of 5-year-old school children

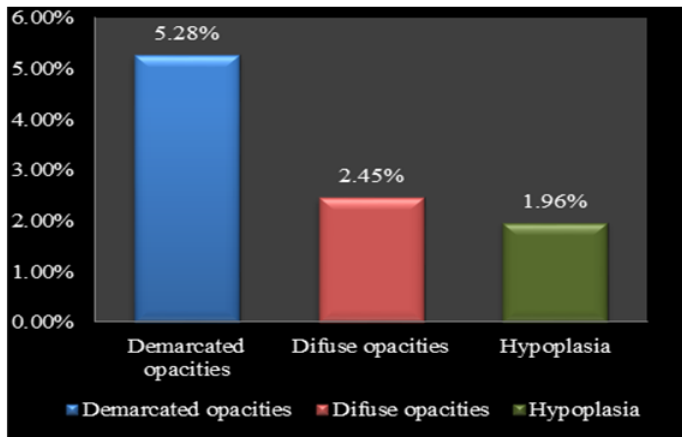


Graph 2: Oral health of 12-year-old school children



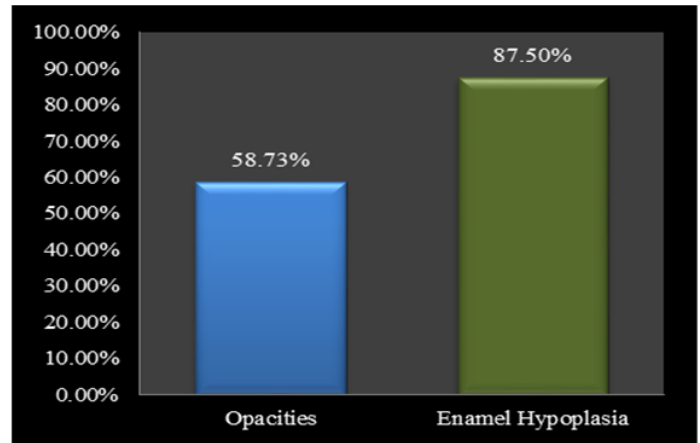
Graph 3: Oral health of 15-year-old school children

Graph 4 shows the total prevalence of DDE. Demarcated opacities were the most commonly seen defect (5.28%), followed by diffuse opacities (2.45%). The prevalence of enamel hypoplasia was the least (1.96%) in the total population. The total prevalence of DDE is 9.69%.



Graph 4: Prevalence of DDE in total population (n=815)

The prevalence of dental caries in children having opacities was 58.73%. The prevalence of dental caries in children having enamel hypoplasia was 87.5%. [Graph 5]



Graph 5: Prevalence of dental caries among children having DDE

The Pearson's coefficient was found to be $r = 0.6\%$ with p value less than 0.05.

Discussion

A cross sectional study was carried out to assess the oral health status, the prevalence of DDE and to find out the correlation of it with dental caries in 5, 12, 15-year-old school children in Panvel Taluka, Maharashtra, India. 5-, 12- and 15-years age group were selected as they are WHO recommended age groups⁴.

In the current study, the prevalence of enamel hypoplasia was 1.96% which was lower than 18.2% as reported by Shailee Fotedar, G. M. Sogi, K. R. Sharma². The prevalence of demarcated opacities (5.28%) was less than that of diffuse (2.45%) similar to reported by Pramod Kumar Yadav et al⁵ and contrary to (Diffuse opacities: 35.0%, Demarcated opacities: 29.5%) reported by F.Vargas-Ferreira et al⁶.

The prevalence of enamel hypoplasia was found more in males compared to females which is similar to most of the studies, including Shailee Fotedar, G. M. Sogi, K. R. Sharma² and Slayton et al⁷ which is in contrast to the National Oral Health Survey and Fluoride Mapping 2003⁸

where no difference was reported among gender regarding enamel hypoplasia.

The prevalence of caries in children suffering from opacities was 58.73% and from enamel hypoplasia was 87.50% which is comparable to most of the studies. The Pearson's coefficient was found to be $r = 0.6\%$ with p value less than 0.05.

In the longitudinal study conducted by Lai, P. Y., Kim Seow, W., Tudehope, D. I., & Rogers, Y⁹, the prevalence of enamel defects was found 96% in low birth weight children. They found a strong association between dental caries and enamel defects (p value <0.001) in low birth weight children in contrary to normal birth weight children, in whom; there was no association seen between DDE and dental caries. In other studies, including ours, a positive correlation is seen irrespective of the birth weight of the children.

In this study, Oral health status was also assessed based on the presence or absence of bleeding on probing, malocclusion and caries. Highest prevalence for caries was seen in the 5 year old age group, the reason might be poor eating habits, and lack of oral hygiene awareness. Malocclusion was seen highest in the 12 year old group (Mixed dentition state). Prevalence of gingivitis was observed more in the 15 year old age group. By that age, all the permanent teeth are erupted. Improper brushing is may be one of the main factors for causing gingivitis.

In the oral health survey conducted by Kumar P. M., Joseph, T., Varma, R. B., & Jayanthi, M¹⁰, 5 and 12 years old school children were selected from 30 schools of Chennai city. Similar to our study, this survey was also based on the WHO oral health assessment. The economic status was also taken into consideration which was lacking in our study.

The main limitation of this study is that we calculated mouth prevalence instead of tooth prevalence. Tooth

prevalence would have a given a better idea about the correlation between developmental defects of enamel and caries. In spite of many studies carried out for DDE, the pathogenesis is still not very clear. Advancements in microbiology will help us understand it better.

Enamel defects are a significant risk factor for dental caries; however, most studies are cross-sectional and have not considered important factors like fluoride exposure. The clinical course of caries is different when associated with DDE since the accumulation of plaque in these areas accelerates the caries process. Oral hygiene improvement and creating awareness regarding dental health should be targeted. We should focus on a younger population as good habits picked up at an early age have a lifelong impact.

In this study, dental caries was the most common oral health problem among all age groups ranging from 67-68%. Malocclusion was more common among 12 years old school children which may be because of mixed dentition period. Gingivitis was seen most commonly among 15 years old school children.

There was statistically significant association between developmental defects of enamel and dental caries.

Conclusion

Dental caries was the most common oral health problem among all age groups ranging from 67-68%. Malocclusion was more common among 12 years old school children which may be because of mixed dentition period. Gingivitis was seen most commonly among 15 years old school children. There was statistically significant association between Developmental defects of enamel and dental caries.

Abbreviations

DDE – Developmental Defects of Enamel

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