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Prevalence of enamel hypoplasia amongst children of Central India

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Abstract
The aim of the study is to record the prevalence of enamel hypoplasia amongst children of Central Indian population. Since it may suggest a higher risk for caries and it can further our understanding of enamel development, enamel hypoplasia is of interest to both clinicians and basic scientists.
Methods: The study sample consisted of 4000 children examined at <13 years of age. Individual tooth surfaces were examined for the presence of enamel hypoplasia (EH). Prevalence of EH were determined by tooth type, different age group and by gender.
Results: Amongst them 139 were found to have enamel hypoplasia. Thus, revealing the prevalence of enamel hypoplasia to be 3.475%. Thus, this study included 139 subjects with Enamel Hypoplasia. The mean age of the subjects was 10.08±1.95412 years. There were 59 (42.4%) males and 80 (57.6%) females. Eighteen subjects (12.9%) were having permanent dentition, 10.1% were having primary dentition and 77% were having mixed dentition. There was statistically no significant association between gender and type of enamel hypoplasia. The type of dentition was found to have no significant association with type of enamel hypoplasia
Conclusions: This study could not determine the association between enamel hypoplasia and risk of dental caries. And it was a hospital-based study and thus, the studied population may not be the true representative of the general population.

Keywords: enamel hypoplasia, children, prevalence

Introduction
Enamel hypoplasia (EH) is a quantitative defect of enamel which may express itself as pits, lines and grooves [1, 2].
Development of enamel hypoplasia occur from the neonatal to infantile stage for the primary canines and from the fetal stage to the early stage of birth or 6 months after birth for second primary molars. It begins from the stage of the matrix formation in many cases. An association has been reported between attempt of threatened abortion, severe hyperemesis gravidarum, anaemia and drugs used in the treatment of these symptoms and development of hypoplasia. [3] Development of exanthematous diseases such as exanthema submonia, common cold and pneumonia, Jaundice, intussusception and asthma within one year after birth of the child can also lead to enamel hypoplasia. It was found that the type of teeth susceptible to damage, the time of damage, sensitivity of individuals, and the type and acuteness of damage, interact in the aetiology of hypoplasia. [3] Thus, it may provide diagnostic clues as to genetic influences and systemic diseases, as well as to any trauma during the span of dental development.[4]No correlation has been found between enamel hypoplasia and unbalanced diet of the mothers during pregnancy. [3] However, few studies have reported significant correlation between nutritional disorders, metabolic disorders and exposures to chemicals such as tetracycline, lead, and fluoride in children and development of enamel hypoplasia. It has been proposed that many of these individual factors may in fact act through a central mechanism: mineral deficiency. [4]
Clinical significance of enamel hypoplasia includes compromised esthetics, tooth sensitivity, heightened risk to dental caries and malocclusion. Therefore, protection of the enamel and effective preventive care and monitoring are required. [1, 4]
Management and prevention against complications of enamel hypoplasia includes application of sealants and remineralizing agents and durable restorations such as composite resins for the anterior teeth and stainless-steel crowns for the molars. [1]
In the present study an effort has been made to find the prevalence of enamel hypoplasia amongst children of Central India. This knowledge may be helpful in working towards preventive and treatment strategy against enamel hypoplasia.

Material & methods
Study design, study site, study duration, sample size and sampling technique
This cross sectional, observational study was conducted in the Department of Pedodontics, Government Dental College, Indore, India. The study included pediatric patients aged <13years belonging to both the genders. Study included all the patients visiting the departments during one year. Details of the patients found to have enamel hypoplasia was recorded. Convenience sampling technique was employed.

Method of data collection
Examination was done in day light, on dental chair and teeth were evaluated for presence of enamel hypoplasia and isolated opacity using a mouth mirror and without drying

the teeth. Presence of enamel hypoplasia and isolated opacity was recorded separately for each tooth. Deficiency in enamel formation such as pits and linear grooves were recorded as enamel hypoplasia. Localized opacity that was white, creamy, yellow or brownish in colour were scored as isolated opacities.

Statistical analysis

Data was analysed using SPSS (Statistical Package for Social Sciences) 21.0 version. Descriptive statistics was performed. Association between two variables was assessed using chi-square test. P value<.05 was considered statistically significant.

Results

In the one year (January 2021-Decmeber 2021), in OPD of Department of Government Dental College, Indore 4000 children were examined. Amongst them 139 were found to have enamel hypoplasia. Thus, revealing the prevalence of enamel hypoplasia to be 3.475%.

Thus, this study included 139 subjects with Enamel Hypoplasia. The mean age of the subjects was 10.08±1.95412 years. There were 59 (42.4%) males and 80 (57.6%) females. Eighteen subjects (12.9%) were having permanent dentition, 10.1% were having primary dentition and 77% were having mixed dentition.

The involvement of all the teeth was observed in 20.1% subjects, whereas 79.9% subjects were having involvement of few teeth only. The most commonly involved teeth were permanent maxillary anterior teeth especially central incisor. In the primary dentition as well, the most commonly affected tooth was maxillary incisor. Localized enamel opacities were found to be common than generalized. Most of the subjects were having demarcated lesion. Demarcated lesions were seen significantly more in localized enamel hypoplasia, whereas diffuse lesions were significantly more in generalized enamel hypoplasia (p value<.05). [Table 1] There was statistically no significant association between gender and type of enamel hypoplasia. [Figure 1] The type of dentition was found to have no significant association with type of enamel hypoplasia. [Chi square value -.169, df-1, p value >.05].

Table 1: Association between different types of enamel opacities.

			Extent		Total
			Localized	Generalized	
Type	Demarcated	Number	76	0	76
		Percentage	69.7%	0.0%	54.7%
	Diffuse	Number	33	30	63
		Percentage	30.3%	100.0%	45.3%
Total		Number	109	30	139
		Percentage	100.0%	100.0%	100.0%

Chi-square test value- 46.151, df-1, p value <.001

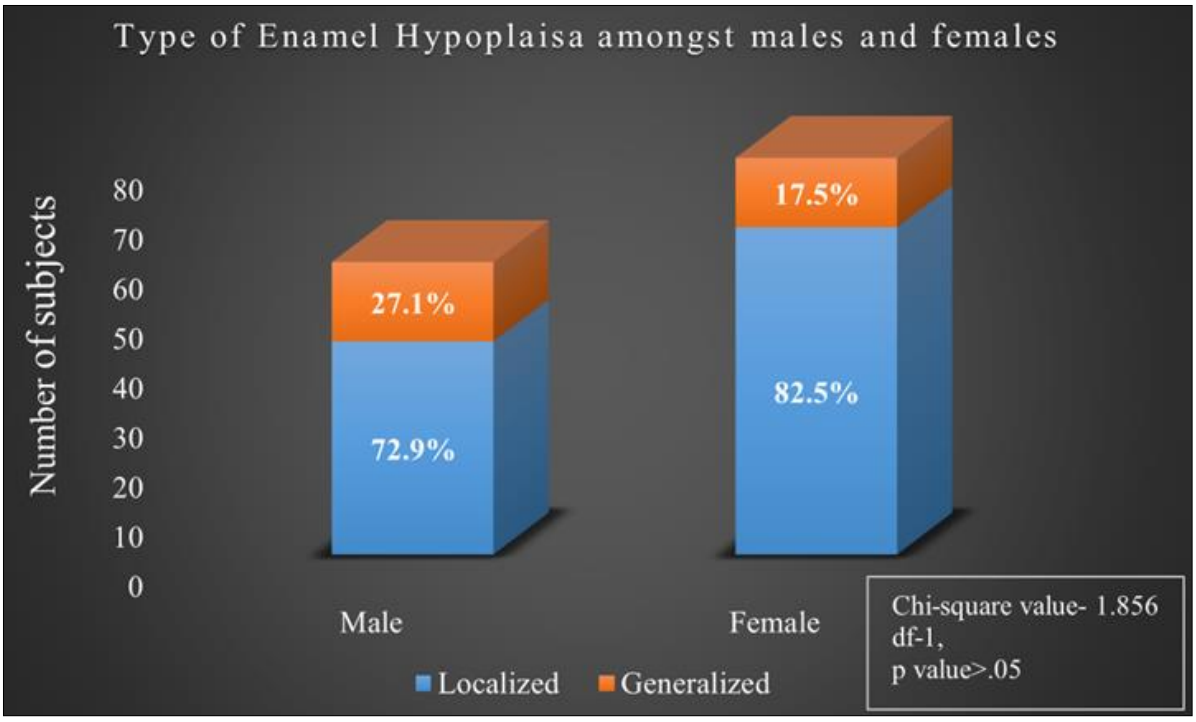

Fig 1: Distribution of different types of enamel hypoplasia amongst male and female subjects.

Discussion

Enamel hypoplasia can be described as the incomplete or defective formation of the organic enamel matrix of teeth. It can occur only during the enamel formation; once the enamel has completed its calcification, no defect can be produced. Enamel hypoplasia gains attentiveness of the dentist, as it increases the risk of dental caries and esthetic concerns. [5]

In the present study the prevalence of enamel hypoplasia was found to be 3.475%. Mukhopadhyay S *et al.* (2014) reported 10.2% prevalence of EH amongst population West Bengal. [6] This difference in the prevalence indicated towards the geographic variation in the occurrence of EH.

In the present study, the amongst the children with enamel hypoplasia, a greater proportion was constituted by females as compared to males (57.6% vs 42.5%). Similarly, Slayton RL *et al.* (2001) reported greater prevalence of enamel hypoplasia amongst females as compared to males, however, in their study, the difference was not statistically significant. The difference between the genders have been reported by other researches as well, although the reason behind this difference still unknown. [7]

In the present study the most commonly affected tooth in primary and permanent dentition were found to be maxillary central incisors. Similar findings were reported by Yadav PK *et al*. (2015) [8] whereas Slayton RL *et al*. (2001) have reported mandibular second molars and maxillary second molars as the most commonly affected tooth in deciduous dentition. [7] According to Lucas JR *et al*. (2001) the tooth most commonly affected by enamel hypoplasia was deciduous canine. [9]

Involvement of greater number of maxillary central incisors could affect the aesthetics of the children. [10]

Limitations of the study

This preliminary study was based on the secondary data and therefore, association of enamel hypoplasia with many suspected risk factors such as socioeconomic status, [11] nutritional status, [12] water- supply and fluoride concentration of water [13] could not be assessed. This study could not determine the association between enamel hypoplasia and risk of dental caries. One more limitation of the study was that it was a hospital-based study and thus, the studied population may not be the true representative of the general population.

However, the high prevalence of EH amongst Indian children warranted the need for further research to find the reason behind this, so that appropriate preventive measures can be taken. The need for preventive measures lies in the fact that possible disintegration of tooth crown can occur because of demarcated opacities on tooth enamel. [14]

Ethical consideration

The study was approved by Institutional Ethics Committee [Ethics committee registration number-], Government Dental College, Indore, India.

Conflict of interest

None

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None

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