

Assessment of DMFT and Enamel Hypoplasia Among Junior High School Children in Iran

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Abstract

Aim: The main purpose of this study was to assess the prevalence and distribution of decayed, missing, and filled teeth (DMFT) and enamel hypoplasia in 12-year old students in junior high school in Iran.

Materials and Methods: This descriptive study was carried out in 2001 on 1,223 12-year old students, which were randomly selected in Yazd and Hadi-Shahr, Iran. A questionnaire was designed to record the status of the teeth along with the occupational and educational levels of parents. Data was analyzed using SPSS software, the Chi-square test, and analysis of variance (ANOVA).

Results: The mean DMFT score was 1.8 ± 1.75 and 28.6% of the students were caries-free. There was no significant relationship between DMFT and the rate of dental caries with parents' education and occupation. The percentage of enamel hypoplasia was 32.7%. No statistically significant relationships were found between hypoplasia and DMFT with regard to gender. The relationship between enamel hypoplasia with DMFT score and dental caries was statistically significant.

Conclusion: In the present study findings for DMFT scores in 12-year old junior high school children are higher than global standards according to the World Health Organization (WHO) references for the year 2000. There was a strong association between enamel hypoplasia and dental caries, and this subject suggests early diagnosis of enamel defects, health education programs, and suitable treatments should be emphasized in junior high school-aged children.

Keywords: MFT score, enamel hypoplasia, enamel defects

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Introduction

It has been addressed by several worldwide epidemiologic studies to determine the prevalence and relationship between decayed, missing, and filled teeth (DMFT) and enamel hypoplasia in each region of the world^{1,2,3}, but little is known about the rate and relationship between DMFT and enamel hypoplasia in Iran.



Majid et al.² studied caries prevalence and enamel defects in 229 Malaysian teenagers between the ages of 12 and 15 years of age. Results showed caries prevalence was 82.2% with a DMFT score of 3.4. The prevalence of enamel defects was 76.4% with 19.1% of all teeth being affected. More posterior teeth than anterior teeth were affected and more maxillary than mandibular teeth were affected by enamel defects. Diffuse patchy opacities were the most common defect diagnosed, and this was found in 60.2% of the population examined. Bilateral distributions of diffuse patchy opacities were seen in 41.5% of the population examined. Tooth surfaces with enamel defects were no more susceptible to caries than caries-free surfaces.

Montero et al.³ studied caries prevalence and enamel defects in 517 children. Results showed the mean DMFT was 3, 38% of the children had carious teeth, and the prevalence of enamel defects was 49%. Linear opacities accounted for 50% of the lesions. A positive association between enamel defects and caries was observed.

To look into these issues with more details, the current study was designed to determine the rate of enamel hypoplasia and to examine its relationships with DMFT index in 12-year old children in Iran.

In 2000 both the World Health Organization (WHO) and the Federation Dentaire Internationale (FDI) announced the age of 12 is of special importance with regard to caries and enamel

hypoplasia⁴ so the present study was done on this age group.

Materials And Methods

The present study was a descriptive, observational, and sectional study in which 1,223 12-year old students (654 boys and 569 girls) from junior high schools in Yazd and Hadi-Shahr, Iran (2001) were examined for developmental defects of enamel and to record all DMFT.

In each city schools were randomly selected as was the study population in each class. A two-part questionnaire was created for recording student characteristics. The first part of the questionnaire was completed by interviewing each student. This part addressed general characteristics such as the frequency of the use of a toothbrush and dental floss, the number of siblings, as well as the parents' job and educational level. The second part was designed to record the DMFT and enamel defects. This part was completed by the study supervisors after examination of the study population's teeth using the limited WHO method.

The examination was carried out using a cycle and cowhorn two headed dental explorer (Aesculap, Germany), a disposable flat dental mirror, and a common lamp or flashlight for illumination. Changes in tooth color, sticking of the dental explorer in occlusal or proximal areas of each tooth, or the presence of a gray or black halo in a proximal surface was considered to be caries. Dressed teeth and restored teeth that had recurrent caries were recorded as caries.

Brushing the teeth using prophylaxis paste prior to examination helps to facilitate the recognition of enamel hypoplasia; however, due to logistical limitations of the present study, examination of the teeth was done without brushing and surfaces of the teeth were only dried using sterile dental gauze. The Developmental Defect of Enamel (DDE) index was used for recording enamel lesions. The examination of teeth for enamel hypoplasia was conducted using FDI guidelines. Buccal and lingual surfaces of each tooth were examined and defected parts were recorded. To facilitate the recording of defect intensity, contract codes were used.

The data were statistically analyzed by SPSS (Delfy/USA), the Chi-square test, as well as analysis of variance (ANOVA). P values of 0.05 were considered indicative of a statistically significant difference.

Results

In this study we examined 1,223 12-year old students from junior high schools in Iran for developmental defects of enamel and DMFT score and its relationships. A positive association between enamel defects and dental caries was observed and this relationship was statistically significant. The mean DMFT score was 1.8 ± 1.75 and 74.73% of the students had caries. Mean DMFT in the girls' group was 1.65 ± 1.55 and 1.95 ± 1.91 in the boys' group. Statistically, there was not a significant relationship between DMFT and gender.

In this study 28.6% of the students were caries-free with 30.05% in females and 27.25% among males. There was no significant statistical relationship between a caries-free population and gender.

The percentage of enamel hypoplasia in the population we examined was 32.7% and 3.13% of all examined teeth had enamel hypoplasia.

The results of the analysis of the questionnaire about the percentage of enamel hypoplasia are presented in Tables 1 and 2. As these tables indicate, the most common teeth with enamel hypoplasia were maxillary central incisors, maxillary lateral incisors, maxillary first premolars, and mandibular first premolars, respectively.

The statistical analysis did not show a significant relationship between enamel hypoplasia and gender. The percentage of enamel hypoplasia in maxillary teeth was 180% higher than in mandibular teeth (4.22 vs 2.03). There was a significant statistical relationship between enamel hypoplasia in mandibular and maxillary teeth. However, this relationship was not significant in either side of each jaw.

Tables 1 and 2 indicate the majority of enamel defects were located on anterior teeth, and Figure 1 demonstrates that incisal one-half of the teeth was the most common location of the enamel hypoplasia. There was a significant statistical relationship between different parts of each tooth and enamel defects (Figure 1).

In the present study more enamel hypoplasia defects were found in facial surfaces than in lingual surfaces. The difference between involvement of facial and lingual surfaces was significant. The results of analysis about the shape and the extension of enamel hypoplasia are presented in Figure 2. Statistical analysis shows a significant relationship between the prevalence of enamel hypoplasia with the shape and extension of defects.

The relationship between the prevalence of enamel defects and kinds of hypoplastic defects was significant. Figure 3 shows the most common lesions were blur linear defects with white and beige color but also shows yellow to brown spots with lesser defects. There was a significant relationship between the prevalence of enamel defects and the color of enamel.

Table 1. Percent of enamel hypoplasia in each of the maxillary teeth.

27	17	26	16	25	15	24	14	23	13	22	12	21	11	Tooth Number
1.63	1.14	2.61	3.05	2	2.21	2.68	2.84	2.45	1.84	4.67	4.69	13	12.31	Percent of enamel hypoplasia

Table 2. Percent of enamel hypoplasia in each of the mandibular teeth.

47	37	46	36	45	35	44	34	43	33	42	32	41	31	Tooth Number
1.86	1.61	1.87	1.56	2.39	2.74	2.46	3.45	0.86	1.51	1.9	1.48	2.97	1.9	Percent of enamel hypoplasia

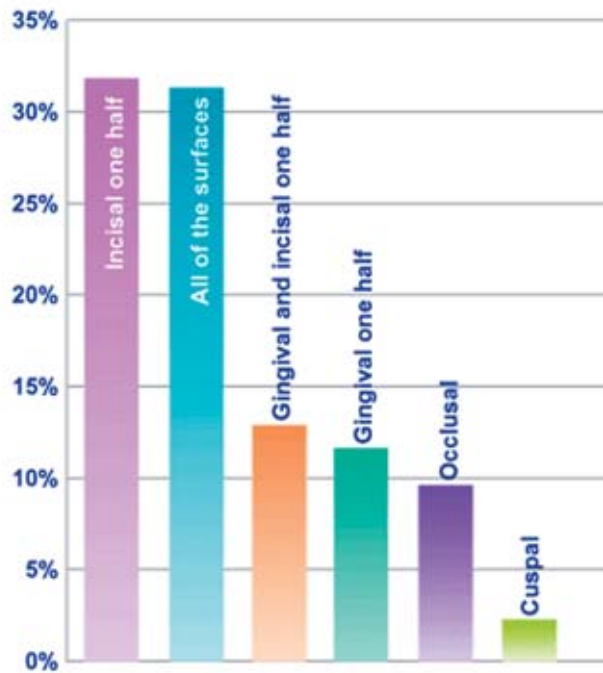


Figure 1. Prevalence percentage of enamel hypoplasia based on the location of the defects.

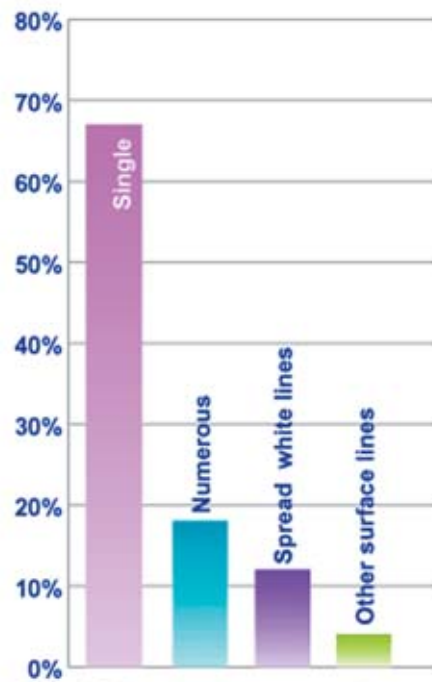


Figure 2. Prevalence percentage of enamel hypoplasia based on the shape and extension of defects.

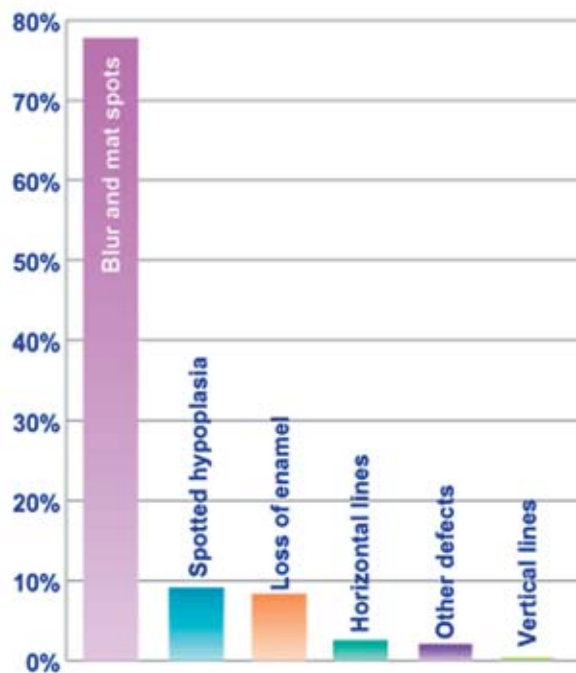


Figure 3. Prevalence percentage of enamel hypoplasia based on the kind of enamel defects.

There was no significant relationship between the number of children in these students' families, the parents' job, education, socioeconomic status, or frequency of toothbrush and dental floss use with either the DMFT factor or enamel hypoplasia.

Discussion

The purpose of this study was to determine the prevalence of enamel hypoplasia, the DMFT index, and its relationship in 12-year old Iranian junior high school students. According to the results of the present study, the DMFT score of the groups we examined were higher than the global standard of the WHO references⁴ (1.8 ± 1.75 vs 1.5), but the finding of DMFT in this study is lower than the standard range of Eastern Mediterranean Region (EMRO) countries.⁴ Iran is in this group of countries. Previous studies in this age group in Iran showed upper amounts of DMFT index.^{5,6,7} Possible explanations for this discrepancy may be due to the attention paid to oral health in Iran during the past ten years, the wide-spread use of fluoride rinses recommended by the Ministry of Health Service in primary schools, and the 12-year old students which were our target group used fluoride rinse from primary school age.

In this study 28.5% of the students were caries-free. This result is near to the caries-free group in Chapple's study⁸, but this result does not support Montero's study with 68% caries-free³ and Dasanayake's study⁹ with 72% caries-free group. Possible explanations for this discrepancy are due to the differences in oral hygiene habits, nutrition, cultural, social, economical, and racial habits of the target populations.

In the present study 32% of the students had enamel hypoplasia, which is near to the Chapple's⁸ study with 23%, but it does not compare to 10% in Weerheigan¹⁰, 46% in Goodman¹¹, 68% in Brook¹², 76.4% in Majid², and 99% according to Pascoe.¹³ Possible explanations for this discrepancy are attributed to the differences in geographical region and the amount of fluoride in the target group's drinking water.

In this study a positive relationship between enamel hypoplasia, dental caries, and DMFT index was found. The results of the present study

supports the findings of both the Montero³ and Pascoe¹³ studies, but not that of Majid² in which there was no difference in caries rate between teeth with enamel defects and healthy teeth.

According to the results of the present study, enamel hypoplasia may be a significant caries risk factor in the examined group. The possible explanations for this discrepancy are perhaps due to less interest in oral hygiene in the students with enamel hypoplasia or less resistance to caries in hypoplastic enamel. However, there was a statistical positive relationship between the prevalence of enamel hypoplasia in maxillary and mandibular teeth. In this respect this study supports the findings of Majid² and Kellerhof.¹⁵

The majority of defects were located on anterior teeth, which was consistent with the Goodman¹¹, Lovell¹⁴, and Montero³ studies. The reason for enamel hypoplasia being more prevalent in anterior teeth may be due to the vulnerability of anterior tooth germs to trauma during tooth development. However, these results are not in agreement with the Kellerhof¹⁵, Majid², and Ekanayake¹⁶ studies which found enamel hypoplasia was more frequently observed in posterior teeth.

In this study single and blur linear defects were the most common type of enamel defects. The findings are in agreement with the results of the Lovell¹⁴, Goodman¹¹, and Majid² studies. However, the results do not support the findings of Montero³ who reported most of the lesions were diffuse opacities in maxillary premolars and anterior teeth. Perhaps one limitation of this study is the examination was done by three persons which may affect the study findings.

Conclusion

The strong association between enamel hypoplasia and dental caries suggests early diagnosis of enamel defects, health education programs, and appropriate treatment should be emphasized in school-aged children. We recommended further research on the relationship between DMFT index and enamel hypoplasia in other countries.

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