



## Enamel Hypoplasia among Tikrit City School Children Aged 6 Years to 13 Years Old

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### Abstract

Enamel hypoplasia: its deficiency could be occurring when the enamel of the tooth does not form completely; this is may be due to many diseases or malnutrition. Enamel hypoplasia could be appear as horizontal lines or chain of grooves or pits over the outer surface of the tooth. The purpose of this current study was to find out the prevalence of enamel hypoplasia for the permanent and deciduous teeth in primary school children in Tikrit city, because children with enamel hypoplasia can suffer from cosmetic issues, tooth sensitivity and increased risk of dental caries. This current study is cross-sectional study was conducted through a clinical examination of teeth among 720 children of age rang (6 to 13) years enrolled in primary public schools of Tikrit city; they were accepted to participate in study after the aim of study was explained. The prevalence of enamel hypoplasia was studied in relation to age and gender. Diagnosis of enamel hypoplasia takes place by well trained dentist. The prevalence of enamel hypoplasia was founded to (6.2%); boys more affected than girls with odds ratio 1.03 and there was no statistically significant differences. The anterior teeth were the most affected teeth with enamel hypoplasia specially the upper permanent central incisor (2.9%). Developmental enamel hypoplasia has a high level of importance because of being predictors of dental caries. Children suffered from enamel hypoplasia require a preventive intervention as a priority and early treatment.

**Key words:** enamel hypoplasia, prevalence, permanent teeth,

### Introduction:

Enamel formation happens in three steps: matrix formations, in which proteins included in amelogenesis are produced; calcification, through this stage mineral content is gained and the proteins are eliminated; maturation, the enamel is totally calcified any proteins remained are eliminated <sup>(1)</sup>. Hypoplasia it's the word from Ancient Greek (hypo-, "under" plasia, "formation"; it is under development or incomplete development of a tissue or organ <sup>(2)</sup>. Enamel hypoplasia is a deficiency of enamel formation. Clinically this is noted as grooves, pits or generalized deficiency of smooth surface enamel. Enamel hypoplasia is significant in the clinical setting because it can cause increased caries susceptibility, increased enamel tear, tooth sensitivity and needy

esthetic <sup>(3)</sup>. Enamel function normally is to preserve and seal the tooth dentin against bacteria; it gives strength to the tooth, and produces a smooth surface which inhibits plaque accumulation on the tooth surface. So enamel with hypoplasia have a higher risk of acquiring dental caries due to diminuting thickness of enamel surface and may provide a more reliable local environment for attachment and colonization of cariogenic bacteria <sup>(4)</sup>. WHO in 1997 classify enamel defect into demarcated opacity, diffused opacity and hypoplasia <sup>(5)</sup>. Enamel hypoplasia was frequent finding in primary and permanent dentition <sup>(6)</sup>. Enamel hypoplasia may afford does not remind signs about the child's early environment and could be predictive of comparable disturbances in the permanent teeth <sup>(3)</sup>. Hypoplasia is most obvious in the permanent dentition and expresses episodes of hindered growth in infancy or childhood periods in which

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these teeth were still growing; once the enamel complete formation, it can no longer be affected<sup>(6)</sup>. Enamel hypoplasia is legally accepted & admissible in a court of law and it is accented as a powerful tool in the investigative of the crime in forensic odontology<sup>(8)</sup>. Enamel hypoplasias result from a temporary disturbance in the amelogenesis, or enamel growth. This disturbance gives visible markers in relatively permanent enamel that is deposited during stress time<sup>(9)</sup>, if ameloblastic activity has been disordered for a long time, gross areas of imperfect or irregular enamel formation result<sup>(10)</sup>. The deficits are in the thickness of the enamel and can be show as alone or multiple pits, wide or narrow troughs, or areas of completely missing enamel area<sup>(8)</sup>. Enamel hypoplasias are losses in the thickness or amount of enamel. Enamel hypoplasias are a quantitative deficit, unlike enamel opacities which are qualitative deficit. Opacities include changes in opacity and color of enamel, indicating variations in quality or hardness of enamel<sup>(11)</sup>. Due to the fact that the enamel does not remodel once it is established, enamel hypoplasias are permanent signs left on the tooth crown that are not lost except from massive wear or pathological status such as decay<sup>(5)</sup>. Enamel hypoplasia could be the result of hereditary factors and environment factors that involve systemic factors such as exanthematous diseases (such as measles, congenital syphilis, chicken pox), hypocalcemia, nutritional factors, birth injury, premature birth, fluoride ingestion or idiopathic causes, and local factors such as trauma to the deciduous tooth or infection<sup>(12)</sup>. In addition, disturbance in the growth of enamel of permanent dentition can be caused by trauma to the primary dentition due to the adjacent proximity of the root of the primary teeth to their permanent successors<sup>(13)</sup>. Individual tooth deficits can be associated with local factors, in contrast to those of systemic etiology many or all of the teeth that are growth during the time of influence of the causative factor; frequently affecting both the primary and permanent dentition<sup>(14)</sup>. The most frequently affected sites of hypoplasia are

the permanent first molars and incisors with specific areas of defect<sup>(15)</sup>.

## Materials and methods:

The study sample evaluates 720 public school children aged between 6 to 13 years old were randomly picked from various primary schools in the Tikrit city. This cross sectional study was conducted from oct 2013 to may 2014. Oral examination was done in classrooms by well trained dentist to assess the present or not of the enamel hypoplasia. Data entry and analysis was conducted through the statistical package for social sciences (SPSS, version 18). Comparison of proportions of different factors among different groups of study sample utilized with Chi square test ( $\chi^2$ ) of association. Odds ratio (OR) was the main method used to recognize the risk. P value of  $\leq 0.05$  was considered as statistically significant.

## Results:

Gender and age distribution of the total sample is shown in Table (1). The prevalence of enamel hypoplasia in children's teeth was observed to be (6.2%), while the children's teeth without enamel hypoplasia about (93.8%) of the total sample examined as shown in Table (2), the prevalence of enamel hypoplasia among boys was (6.3%) which is higher than that founded in girls (6.1%) with odds ratio about 1.03. The anterior permanent teeth was shown having high prevalence of enamel hypoplasia as this group, it's about (3.8%) among the boys as compared with girls which is about (2.9%), this relation was statistically not significant, P value  $> 0.67$ ; ( $X^2 = 1.47$ ,  $df = 3$ ). Concerning the age groups it found that (6-7) years; the most common enamel hypoplasia was affecting deciduous teeth (2.8%), while among the age group (8-9) years it was affecting anterior and posterior teeth (4.3%), among the age group (10-11) years it was found anterior teeth mostly affected (4.1%), and among the age group (12-13) years it was affecting anterior teeth (4.7%).

Statistically significant relationship (P value < 0.002; ( $X^2 = 26.23$ ,  $df = 9$ ) further illustrated in Table (3). The most frequently affected tooth with enamel hypoplasia was found the upper permanent central incisor (2.9%) followed by permanent canines and molars (0.8%). The lowest frequency was shown in this study were lower permanent canine, lower deciduous molar and in both upper and lower deciduous teeth (0.1%) as shown in Table (4).

### **Discussion:**

This study is the first investigation of primary school children in the city of Tikrit to assess the enamel hypoplasia in the deciduous and permanent dentition. The prevalence of children with enamel hypoplasia was founded to be (6.2%), versus (93.8%) of the total sample examined. This prevalence was founded to be higher than certain Iraqi studies in enamel hypoplasia<sup>(16-19)</sup> and lowest than prevalence of other Iraqi studies<sup>(20-24)</sup> as concerning other countries study, as in Saudi Arabia show higher prevalence than this study; it's about 15% but lowest prevalence in Great Britain which is 4%<sup>(3)</sup>. Cultural and behavioral diversity may describe this difference between the countries and even in the same country. Differences in sampling and diagnosis criteria between various studies also illustrated the differences in finding<sup>(25)</sup>. Relation to the gender; this study revealed that males more affected than female with odds ratio 1.03. This study was disagreement with other study which shows no gender differences<sup>(14)</sup> and other study which shows the prevalence of enamel hypoplasia was higher in girls than boys<sup>(26)</sup>. Males have greater sensibility based on the concept of inheritance. They would be assumed to show higher enamel hypoplasia than female in stressful environments, sex discrepancies may be caused by the duration of crown

development; in permanent teeth of female affording more opportunity for environmental disruption to affected crown development and also might be caused the size of teeth crown where it is larger in male than female.<sup>(27)</sup> The most frequent effected tooth with enamel hypoplasia in this study was founded to be the upper permanent central incisor (2.9%) followed by permanent canines and molars (0.8%). This result was agreed with other study<sup>(26)</sup> and this may be due to that the secretary phase for development of the permanent incisor and first molars begins in utero whereas the maturation process begins after birth and thus any trauma of inadequate mineralization can result in defect of enamel<sup>(28)</sup>.

### **Conclusions:**

Enamel hypoplasia: it's a deficiency in enamel formation which can be observed as grooves, pits or generalized reduction of enamel surfaces. Enamel hypoplasia is valuable clinically because it could cause increase caries susceptibility, tooth sensitivity, teeth wear, and needy esthetic. The prevalence of enamel hypoplasia in this study was founded to be 6.2% among 720 children aged 6-13 years old; randomly selected from primary school in tikrit city. Boys show higher prevalence than girls with odds ratio 1.03, statistically not significant difference. The more teeth affected with enamel hypoplasia were founded to be the anterior permanent teeth with age group 10-11 years old, statistically significant relationship was noted. The teeth which were most impacted by enamel hypoplasia was the upper permanent central incisor followed by permanent canine and molar. Suggestions of other studies; this study need to be repeated after several years to evaluate and monitor any changes that may be occurs, and need to be done with different age group regarding the classification of enamel hypoplasia.

Table (1): The study sample distributed according to the age groups and gender

gender	Age groups				total
	6-7	8-9	10-11	12-13	
boys	85	108	168	82	443
percentage	19.5%	24.4%	37.9%	18.5%	100%
girls	56	78	103	40	277
percentage	20.2%	28.2%	37.2%	14.4%	100%
total	141	186	271	122	720
percentage	19.6%	25.8%	37.6%	17%	100%

Table (2): The total sample distributed according to the present of enamel hypoplasia with the gender

Enamel hypoplasia	gender				total	
	boys	%	girls	%	No	%
normal	415	93.7	260	93.9	675	93.8
Anterior permanent teeth only	17	3.8	8	2.9	25	3.5
Anterior and posterior permanent teeth	8	1.8	5	1.8	13	1.8
Deciduous teeth	3	0.7	4	1.4	7	1.0
Total enamel hypoplasia	28	6.3	17	6.1	45	6.25
Total of the sample	443	100	277	100	720	100

Table (3): Enamel hypoplasia in total sample according to the age groups.

Age group	normal		Enamel hypoplasia						Total	
			Anterior permanent teeth only		Anterior & posterior permanent		Deciduous teeth			
	no	%	no	%	no	%	No	%	no	%
6-7	135	95.7	1	0.7	1	0.7	4	2.8	141	100
8-9	172	92.5	4	2.2	8	4.3	2	1.1	186	100
10-11	257	94.8	11	4.1	2	0.7	1	0.4	271	100
12-13	111	91.0	9	4.7	2	1.6	0	0	122	100
total	675	93.8	25	3.5	13	1.8	7	1.0	720	100

Table (4): The enamel hypoplasia in study sample according to the frequency of affected tooth.

Teeth with enamel hypoplasia	frequency	%
Normal teeth	675	93.8
Upper permanent central incisor	21	2.9
Lower permanent incisor	3	0.4
Lower permanent canine	1	0.1
Permanent canine and molar	6	0.8
Permanent incisor and molar	5	0.7
Lower permanent molar only	2	0.3
Upper deciduous incisor only	5	0.7
Lower deciduous molar only	1	0.1
Upper and lower deciduous teeth	1	0.1
total	720	100

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