# Gingival condition, enamel anomalies and traumatic dental injuries among 14-15 years intermediate school male students in Al-Khalis City/Iraq

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#### ABSTRACT

**Background:** One of the most common and prevalent oral diseases among adolescents is periodontal disease particularly gingivitis, however enamel anomalies and dental trauma could occur.

Aims of the study: This study was conducted among 14-15 years intermediate school male students in urban area of Al-Khalis city to assess the oral hygiene (dental plaque) and to estimate the prevalence and severity of gingivitis, enamel anomalies, as well as traumatic dental injuries, furthermore to show the significant difference between these two ages concerning these oral problems.

**Materials and methods:** In this study the total sample consisted of 735 students (397 aged 15 years and 338 aged 14 years). In present study dental plaque was recorded according to the criteria of Plaque index by Silness and Loe (1964), while gingival status was determined according to the criteria of gingival index by Loe and Silness (1963). Enamel anomalies were examined and recorded according to WHO (1997). Dental trauma of permanent anterior teeth was assessed according to Garcia-Godoy classification.

**Results:** The mean plaque index of the total students was (1.12±0.010). It was higher among 15 years students than 14 years students with statistically highly significant difference (p<0.01).

The prevalence of gingivitis was 99.45%, and the mean gingival index was (1.50±0.013) which was higher among 15 years students than 14 years students with statistically no significant difference (p>0.05).

The prevalence of enamel anomalies in the total students was 49.93%. The mean value of diffuse opacity was higher among 15 years students than 14 years students, furthermore, the diffuse opacity constituted a highest percentage of enamel defects among affected students.

The prevalence of dental trauma was 6.12%. The prevalence of dental trauma was significantly higher among 14 years students than 15 years students (p<0.05).

**Conclusions:** This oral health survey revealed a high prevalence of gingivitis, followed by enamel anomalies and dental trauma, thus, those students need for school and public dental health preventive programs.

Keywords: Gingival condition, enamel anomalies, traumatic dental injuries. (Received: 10/9/2017; Accepted: 3/10/2017)

## **INTRODUCTION**

Periodontal disease is the second most prevalent inflammatory oral disease, it may involve gingiva, periodontal ligaments, and alveolar bone <sup>(1)</sup>. On the basis of destructive nature, periodontal disease can be divided into gingivitis and periodontitis <sup>(2)</sup>. Gingivitis is the most common type of periodontal diseases that starts early in life and becomes more sever with age <sup>(3)</sup>. In Iraq, several epidemiological studies were conducted in different geographical locations, and these studies showed a high prevalence and severity of gingivitis among different ages and gender <sup>(4, 5)</sup>.

Enamel anomalies defined as disturbances in hard tissue matrices and their mineralization during odontogenesis phase of tooth development. It clinically appears as one or more of its common three forms as demarcated opacities, diffuse opacities, and hypoplasia<sup>(6)</sup>.

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Epidemiological studies conducted in Iraq revealed different results of the prevalence and severity of enamel anomalies <sup>(5,7,8)</sup>.

Traumatic dental injury is another oral problem affecting adolescents, and can be defined as an injury to the lips, tongue, and mouth involving teeth and its supporting structures as gingiva, periodontal ligaments, and alveolar bone<sup>(9)</sup>. Epidemiological studies conducted in Iraq showed different results concerning the prevalence and severity of dental trauma<sup>(10-12)</sup>.

There was no previous epidemiological study investigating the above mentioned oral problems and any other oral problems among 14 and 15 years students in Al-Khalis city/ Diyala/ Iraq, so this study was conducted to gain the knowledge about these oral problems and to focus some light on the availability and effectiveness of preventive programs and oral health services among those populations.

#### MATERIALS AND METHODS

This study was conducted among 14 and 15 years intermediate school male students living in urban area in Al-Khalis city/ Diyala/ Iraq. All students

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aged 14 and 15 years were included in this survey, thus the total number of students at these ages was 735 (397 students aged 15 years and 338 students aged 14 years).

A permission was obtained from the General Direction of Education of Al-Khalis prior to data collection. Furthermore, consent forms were prepared and sent to students' parents to insure their cooperation and their acceptance for involving their sons in this survey.

Dental plaque was recorded according to the criteria of Plaque index by Silness and Loe <sup>(13)</sup>, while gingival index by Loe and Silness was used to assess the gingival health condition <sup>(14)</sup>. Furthermore, enamel anomalies were examined and recorded according to the criteria of enamel anomalies index described by WHO <sup>(15)</sup>. Dental trauma of permanent anterior teeth was assessed according to Garcia-Godoy classification <sup>(16)</sup>.

Data description, analysis and presentation were performed using Statistical Package for social Science (SPSS version 21). Statistical tests used in this study were Levene test, Pearson Correlation(r) and t-test (paired t-test and two independent sample t-test). Level of significance was tested as probability of error (p-value) as follow: not significant at P> 0.05, significant at p< 0.05, marginal significant at p= 0.05 and highly significant at p< 0.01.

#### RESULTS

Table (1) illustrates the distribution of the total sample by age.

 Table (1): Distribution of the total sample by age.

Age (Year)	No	%	
14	338	46.0	
15	397	54.0	
Total	735	100	

Table (2) demonstrates the mean plaque index of both age groups and the total sample, it was found that the mean plaque index was  $(1.12 \pm 0.010)$  for the total sample, regarding age, the mean plaque index increased with advancing age, thus, it was higher among 15 years students than 14 years students, and the difference was found to be statistically highly significant (p< 0.01). In present study, the occurrence of dental plaque in the total sample was 99.86%.

Table 2: Plaque Index (Mean±SE) among students by age.

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Age	PlI	Statistical test		cal test
(Year)	Mean ± SE	t-test	df	p-value
14	$1.09 \pm 0.015$			
15	$1.15 \pm 0.014$	2.759	733	0.006
Total	$1.12 \pm 0.010$			

Table (3) illustrates the mean gingival index of both age groups and the total sample. From the Table, it was found that the mean gingival index was  $(1.50 \pm 0.013)$  for the total sample, regarding age, the mean gingival index increased with age, thus, it was slightly higher among 15 years students than 14 years students, however the difference was statistically not significant (p>0.05). The prevalence of gingivitis for the total sample was 99.45%.

 Table 3: Gingival Index (Mean±SE) among students by age.

<b>V</b> U				
Age (Year)	GI	Statistical test		test
	Mean±SE	t-test	df	p-value
14	$1.50 \pm 0.02$			
15	$1.51 \pm 0.02$	0.420	733	0.675
Total	1.50 ±0.013			

Table 4 illustrates the correlation between plaque and gingival indices in the total sample. The dental plaque was found to be positively correlated with gingivitis (r > 0.5) and statistically highly significant (p < 0.01).

# Table 4: Correlation coefficient between plaque and gingival Indices among students in the total sample

the total sample			
Statistics	PII X GI		
r	0.660		
р	0.000 (HS)		

#### HS= Highly significant (p< 0.01)

Figure (1) shows the distribution of students according to the severity of gingivitis by age. It was found that the moderate gingivitis was the most prevalent type, followed by mild gingivitis in the total sample and both ages.



Figure 1: Distribution of students according to the severity of gingivitis by age.

Table (5) demonstrates the distribution of students with enamel anomalies in the total sample and by age. It was found that the prevalence of enamel anomalies in the total sample was (49.93%).

# Table 5: Distribution of students with<br/>enamel anomalies by age.

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Age (Years)		<b>Enamel Anomalies</b>		
		without	with	
	No.	146	192	
14	%	43.20	56.80	
	% of Total	19.86	26.12	
15	No.	222	175	
	%	55.92	44.08	
	% of Total	30.21	23.81	
Total	No.	368	367	
	%	50.07	49.93	
	% of Total	50.07	49.93	

Figure (2) shows the distribution of students according to the specific type of enamel anomalies in the total sample and by age. It was found that diffuse opacity was the most prevalent type followed by demarcated opacity, while hypoplasia was the less prevalent type in the total sample and both ages.



Figure 2: Distribution of students according to specific type of enamel anomalies in the total sample and by age.

Table (6) illustrates the traumatic dental injury among students by age. It was found that the prevalence of traumatic dental injury was 6.12%, and the prevalence of traumatic dental injury was significantly higher among 14 years students than 15 years students (p< 0.05, Chi-square= 6.575, d.f= 1).

Table 6:	Traumatic	dental	injury	among
	students	s by ag	е.	

Age (Years)		Traumatic dental injury	
		with	
	No.	29	
14	%	8.58	
	% of Total	3.95	
	No.	16	
15	%	4.03	
	% of Total	2.17	
Total	No.	45	
	%	6.12	
	% of Total	6.12	

Figure (3) shows the distribution of students according to the type of dental trauma in the total

sample. It was found that simple enamel fracture was the most prevalent type of dental trauma followed by enamel and dentine fracture in the total sample and by age.



#### Figure 3: Distribution of students according to type of traumatic dental injury in the total sample and by age.

#### DISCUSSION

This study was conducted among 14 and 15 years intermediate school male students living in urban area of Al-Khalis city/Diyala/Iraq, as no previous epidemiological studies concerning oral health were conducted among these ages or for any other ages, so, the results from this study can be used for comparison with the results of other Iraqi studies and other different studies in the world for the intermediate school students of the same ages. In this study, the prevalence of gingivitis was 99.45% which was higher than that reported by other studies conducted in Iraq (4, 5), while it was lower than that reported by others (8, 17). This difference in the prevalence of gingivitis among different studies may be attributed to several factors as variation in sample size, age, gender, race and ethnicity, socioeconomic status, as well as, geographical location <sup>(2)</sup>. The present study revealed that the prevalence of gingivitis increased with age, and the same finding was reported by other studies <sup>(8, 18)</sup>, on the other hand other studies showed that the prevalence of gingivitis decreased with age <sup>(19)</sup>. This increase in gingivitis could be explained by an increase in the amount of dental plaque with age, as a positive and statistically significant correlation between dental plaque and gingivitis was reported in this study, and it was proven by different experimental and observational studies that the dental plaque is considered as main cause of gingivitis and both conditions (dental plaque and gingivitis) get worse with age  $^{(1)}$ .

The present study reported that the prevalence of enamel anomalies was 49.93% for the total sample, which was higher than that reported by other studies <sup>(5, 8)</sup>, while it was lower than that reported by other study <sup>(20)</sup>. Additionally, the present study revealed that diffuse opacity was the most prevalent type of enamel defect followed by demarcated opacity in the total sample and both ages.

This study revealed that the prevalence of dental trauma in the total sample was 6.12% which was higher than that reported by other studies in Iraq and other countries <sup>(17, 21, 22)</sup>, while it was lower than that reported by others <sup>(23, 24, 25)</sup>. This difference in the prevalence of traumatic dental injury could be attributed to differences in age, gender, geographical location, or classification system used during examination of studied population.

This study revealed that the prevalence of dental trauma was higher among 14 years students than 15 years students (decreased with age), while other studies conducted among different ages in Iraq and other countries reported that the prevalence of dental trauma increased with age <sup>(10, 26, 27)</sup>. This finding could be explained by that, the students who aged 14 years may have more energetic action, so they may be at higher risk of traumatic dental injury, additionally, as the subjects grow older, they become more sensitive from their false behavior as well as tend to listen to their teacher and parent's advice <sup>(28)</sup>.

The percentages of students who have simple enamel fracture as well as enamel and dentine fracture were high as compared to other types of traumatic dental injuries. This could be explained by the fact that, these two types of dental injuries may not provoke the parents for immediate dental treatment as the cases with other luxation injuries <sup>(29)</sup>.

The increase in the prevalence of gingivitis as well as enamel anomalies and traumatic dental injury among intermediate school male students in Al-Khalis city/ Diyala/ Iraq may indicate the need for public and school preventive programs for those students, as dental health education and improvement of dental knowledge and attitude toward better oral hygiene.

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#### المستخلص:

**خلفية الموضوع:** واحدة من أكثر أمراض الفم شيوعا وانتشارا بين المراهقين هي أمراض اللثة وخاصة التهاب اللثة, ومن بين المراهقين، فإن هناك مشاكل فموية أخرى (تشوهات المينا ورض الاسنان الامامية).

الهدف من الدراسة: أجريت هذه الدراسة بين 14-15 سنة من طلاب المرحلة المتوسطة من الذكور في المنطقة الحضرية بمدينة الخالص لتقييم نظافة الفم (صفيحة الأسنان الجر ثومية) وتقدير مدى انتشار وشدة التهاب اللثة وشذوذ المينا، وكذلك الحالات الرضية للأسنان الامامية.

المواد والطرق: في هذه الدراسة كانت العينة الكلية مكونة من 735 طالبا ( 338 طالب بعمر أربعة عشر عاما و 397 طالب بعمر خمسة عشر عاما). ،و قد استخدم مقياس ( Silness and Loe, 1964). لتحديد تر اكمات الصفيحة الجر ثومية للأسنان، في حينُ تم تقييم الحالة الصحية للثة باستخدام مقياس التهاب اللثة (Loe and Silnes, 1963). تم فحص وتسجيل حالات تشوهات المينا وفقا لمنظمة الصحة العالمية (WHO, 1997). تم تقييم الأصابات الرضية للأسنان الامامية وفقاً لنظام التصنيف الذي وصفه (Garcia- Godoy, 1981). النتائج:

أظهرت هذه الدراسة الاستقصائية عن طريق الفم أن قيمة مؤشر متوسط الصغيحة الجرثومية كانت 0.010 ± 1.1 في العينة الكلية، كما انها كانت أعلى عند الطلاب بعمر 15 عاما من الطلاب بعمر 14 عاما وبفوارق معنوية كبيرة (P<0.01) .

في هذه الدراسة، كانت نسبة الإصابة بالتهاب اللثة للعينة الكلية 99.45%، وكان متوسط قيمة مؤشر التهاب اللثة 0.013 ± 1.50 ± 1.50 . و علاوة على ذلك، كان متوسط قيمة مؤشر التهاب اللَّنَّة أعلى بين الطلاب بعمر 15 عاما من الطلاب بعمر 14 عاما وبدون وجود فوارق معنوية .(p>0.05)

كان انتشار تشوهات المينا للعينة الكلية 49.93٪. وفيمًا يتعلق بالعمر، كانت أعلى بين الطَّلاب بعمر 14 عاما (56.80٪) من الطلاب بعمر 15 عاما (44.08٪). وكان متوسط قيمة أي نوع من تشوهات المينا أعلى بين الطلاب بعمر 14 عاماً من الطلاب بعمر 15 عاماً، وكان العكس صحيح لنوع العتامة المنتشر (diffuse opacity). في العينة الكلية وجد ان العتامة المنتشرة (diffuse opacity) هي الأكثر انتشارا من بقية تشوهات الميذا (7.74٪)، تليها العتامة المحددة (diffuse opacity) (2.31)، وكانت النتيجة هي نفسها لكلا العمرين على حدى.

وكانت نسبة انتشار الإصابات الرضية للأسنان الامامية للعينة الكلية 6.12%. وفيما يتعلق بالعمر، كان معدل الانتشار أعلى بين الطلاب بعمر 14عاما من الطلاب بعمر 15 عاما وبغوارق معنوية (P <0.05) =P 57.5 =Chi-square). وكشفت هذه الدراسة أنه في العينة الكلية، كمان كسر المينا البسيط هو النوع الأكثر انتشارا اللإصابات السنية (6.3.4٪)، يليه كسر وبورون العاج (1.0%) ٢٠ ٦/٥.٥ ٢٢ مالله ٢٢٠). وعسر العاج مع التعرض لللب ( 4.1%)، تم تسجيل نفس النتيجة لكل من الفئات العمرية. المينا و العاج (1.0%)، في حين أن النوع الأقل انتشارا كان المينا وكسر العاج مع التعرض لللب ( 4.0%)، تم تسجيل نفس النتيجة لكل من الفئات العمرية. الاستنتاجات: قد تشير الزيادة في انتشار التهاب اللثة وكذلك حالات الشذوذ في المينا والحالات الرضية للأسنان بين طلاب المدارس المتوسطة في مدينة الخالص / ديالي / العراق إلى

الحاجة إلى برامج وقائبة عامة ومدرسية لهؤلاء الطلاب، مثل التثقيف الصحي للأسنان وتحسين المعرفة السنية والاسلوب نحو نظافة الفم بشكل أفضل.