Gingival Condition and Enamel Defect Among Secondary School Female Students in Kirkuk City/Iraq

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ABSTRACT

Background: Gingivitis is one of the most common and widely spread oral diseases in adolescents after dental caries occur in both developed and developing countries. Dental plaque is the main etiological factor of gingivitis. Another oral problem is enamel defect.
The aim of this study was to estimate the oral hygiene (dental plaque), and determine the prevalence and severity of gingivitis and enamel defects among 16-17 years old secondary school female students in urban areas of Kirkuk city/Iraq.

Materials and methods: A representative sample included in this study consisted of 750 secondary school female students distributed into 387 for the age sixteen and 363 for the age seventeen, they were selected randomly from different female secondary schools in the urban areas of Kirkuk city. Dental plaque was assessed using plaque index of Silness and Loe (1964). The gingival health condition was assessed using gingival index of Loe and Silness (1963), while, enamel anomalies was determined following the criteria of WHO.

Results: The mean value of plaque index for the total sample was 0.92±0.02. The prevalence of gingivitis was (88.53%) and the mean value of gingival index was 0.90±0.02. Regarding age, the mean value of gingival index increased with age with statistically no significant difference (P>0.05). There was a strong positive and statistically highly significant correlation between plaque and gingival indices for total sample and for both ages (P<0.01). Regarding enamel defects, the prevalence of enamel anomalies among the total sample was 40.27% and diffused opacity was the most prevalent type of enamel anomalies, while, the least prevalent type was diffused opacity and hypoplasia. The lower 1st molars were the most affected teeth by enamel defects.

Conclusion: In present study, the high prevalence of gingivitis among secondary school females indicated the need for either a school or public educational programs to improve the knowledge and attitude towards proper oral hygiene practices.

Keywords: Oral hygiene, Gingivitis, enamel anomalies, Kirkuk city. **(J Bagh Coll Dentistry 2018; 30(1): 80-85)**

INTRODUCTION

Periodontal disease is an inflammatory disease that involves the supporting tissue of the teeth. It was divided into two types: gingivitis and periodontitis [(1)]. Gingivitis is the most common type of periodontal disease. It refers to inflammatory reactions confined to marginal gingival tissues with no obvious loss of bone or connective tissue attachment [(2)]. It is a reversible condition which may start early in life and may increase in severity with age [(3,4)]. If left untreated; it can lead to periodontitis (irreversible) and ultimately loss of teeth [(5)]. Dental plaque is bacterial collection with their products accumulate on the teeth or other oral structures [(6)]. It is a principal etiological factor for plaque-induced gingivitis and other forms of periodontal diseases [(7,8)].

Enamel defects can be defined as any alteration in the hard tissue that result from wide disturbances during the process of odontogenesis, these defects may be quantitative in nature, presenting clinically as a deficient in the enamel thickness or enamel hypoplasia or qualitative in nature as in hypo-mineralization manifest as enamel opacity which is either demarcated or diffuse[(9)].

In addition to esthetic problems, enamel anomalies responsible for dental sensitivity, occlusal function and predisposing factor to tooth erosion and wear [(10-12)]. Additionally, these defects regarded as the main risk factors for dental caries although its nature has not been identified and its cause is not clear [(13)].

Limited studies were conducted concerning gingival condition and enamel defects among secondary school female students aged 16-17 years old in Iraq. Additionally, there was no previous epidemiological study concerning oral health status for any age in Kirkuk city, therefore, this study was conducted to gain knowledge concerning oral health status (oral hygiene, gingival condition, and enamel defects) among 16-17 years old secondary school female students in Kirkuk city which allow for comparing results with the results of other studies in Iraq and other communities.

MATERIALS AND METHODS

The representative sample consisted of 16-17 years old secondary school female students in urban areas of Kirkuk city/Iraq. It included 750 female students distributed into 387 for 16 years old and 363 for 17 years old female students (the female students and 24 secondary schools were selected randomly).

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Permission was obtained from the General Directorate of Education of Kirkuk city in order to meet subjects without obligation. Additionally, a specific consent form was prepared and distributed to the students' parents to get the permission for including their daughters in the study with full cooperation. Each student without license from their parents, with serious systemic diseases, wearing orthodontic appliance, uncooperative or married were not examined. Dental plaque was assessed using plaque index of Silness and Loe [14]. The gingival health condition was assessed using gingival index of Loe and Silness [15], while, enamel anomalies followed the criteria of WHO [3]. Analysis and processing of the data were carried out using Statistical Package for Social Sciences (SPSS) version 21. Levene test, statistical t-test, and Pearson correlation (r) were applied to test the differences between results. P-values less than 0.01 were considered as statistically highly significant, while, P-values less than 0.05 were recorded as statistically significant. Simple and cluster bar charts were also used.

RESULTS

The distribution of the sample is illustrated in table 1. For the total sample, the female with dental plaque was 88.67%. The prevalence of gingivitis was 88.53% and it was found that mild type of gingivitis was the most prevalent type followed by moderate type for the total sample. The same finding was recorded for 16 and 17 years old students as illustrated in figure 1.

The mean values of plaque and gingival indices were 0.92±0.02 and 0.90±0.02 respectively. Regarding age, the mean values were increased with age with statistically no significant difference (P>0.05) as illustrated in table 2 and 3.

Table 4 illustrates the correlation coefficient between plaque and gingival indices among students for the total sample and by age. The results showed that there were strong positive and statistically highly significant correlations between plaque and gingival indices for total sample and for both ages (P<0.01).

For the total sample, the prevalence of enamel anomalies was 40.27% as illustrated in figure 2, and the most prevalent type of enamel anomalies was diffused opacity (31.2%) followed by demarcated opacity (7.6%) as shown in figure 3.

Figure 4 illustrates percentage of teeth affected by enamel anomalies in the total sample. For the total sample, the percentage of enamel anomalies was higher in the lower right and left 1st molars followed by upper left and right central incisors respectively.

Table 1: Distribution of total sample by age.

Age (Year)	NO	%
16	387	51.6
17	363	48.4
Total	750	100
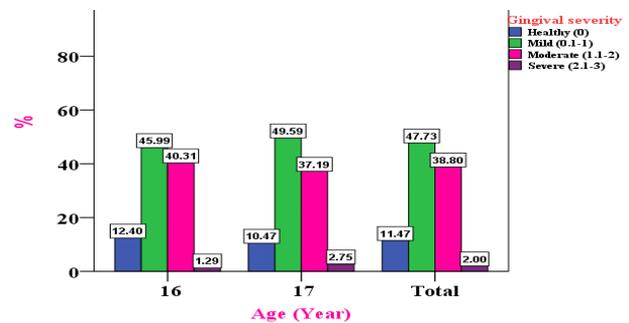
Figure 1: Distribution of female students according to severity of gingivitis by age.

Table 2: Plaque index (mean and standard error) among female students by age.

Age (Year)	Mean ±SE	Statistical test		
		T-test	df	P-value
16	0.91 ±0.03	0.478	748	0.633
17	0.93 ±0.03			N.S
Total	0.92 ±0.02			

N.S= Not significant (P-value>0.05)

**Table 3: The gingival index (mean and standard error) among female students by age.**

Age (Year)	Mean ±SE	Statistical test		
		T-test	df	P-value
16	0.90 ±0.03	0.278	748	0.781
17	0.91 ±0.03			N.S
Total	0.90 ±0.02			

N.S=not significant (P-value>0.05).
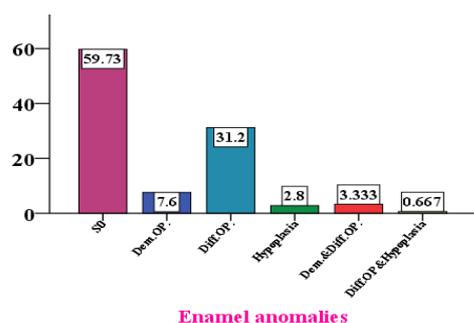
Table 4: Correlation coefficient between plaque index and gingival indices among female students by age.

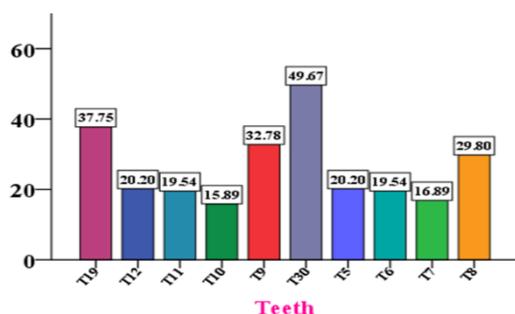| Age (year)	r	p
16	0.957	0.000 (H.S)
17	0.917	0.000 (H.S)
Total	0.937	0.000 (H.S)

H.S= Highly significant (P<0.01)
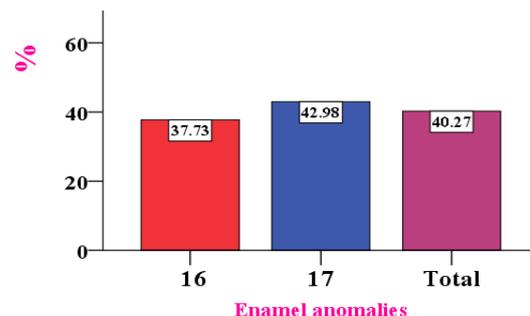
Figure 2: Distribution of total sample with enamel anomalies by age.

Figure 3: Distribution of the total sample according to specific types of enamel anomalies.

Figure 4: Percentage of teeth affected by enamel anomalies in the total sample.

DISCUSSION

This study was the first epidemiological study conducted in urban area of Kirkuk city/Iraq concerning oral health status (gingival health status and enamel anomalies) among 16-17 years old secondary school students and since there was no previous epidemiological study concerning this age and other ages in Kirkuk city/Iraq, thus the result of this study can be compared with the result of other epidemiological Iraqi studies in other governorates and others in different parts of the world which follow the same criteria.

In the current study, the mean value of plaque index for total sample was lower than that reported by other studies [16-18]. On the other hand, it was higher than that recorded by others [19,20]. This variation may be due to differences in sample size, residency (urban or rural), knowledge, and attitude. Additionally, the amount of dental plaque accumulation in individuals varies in accordance to their tooth brushing practices [21] and diet [22]. Concerning age, it was found that the mean value of plaque index increased with increasing age. The same finding was recorded by others [20,23], while an opposite finding was recorded by other study [17]. The prevalence of gingivitis was higher than that reported by some studies [18,24,25], on the other hand, it was lower than that reported by others [23,26,27]. Variation among studies may be related to differences in the design of the study, and/or in the diagnostic criteria. Additionally, the prevalence of gingivitis is affected by many factors including gender, the presence of plaque, genetic, behavioral [28,29], socioeconomic, cultural, and geographical factors [18].

The high percentage of dental plaque in this study could explain the high percentage of gingivitis as dental plaque proven a prime inducer of gingivitis [30] and this was supported by the positive strong and statistically highly significant correlation between dental plaque and gingivitis in the present study. The same correlation was also reported by other studies [23,31]. Additionally, the high percentage of gingivitis may be due to other causes like hormonal changes due to puberty [32], or less attitude to visit dental clinic, and even for those brush their teeth, they may brush in an incorrect way, however this explanation needs to be confirmed in further study concerning oral hygiene practices among those students. It has been well supported that dental plaque formation increases during gingival inflammation in which the gingival crevicular fluid during inflammation increases the supply of nutrients for plaque forming bacteria [30]. The mean value of gingival index in this study was higher than that reported by some studies [19,20,33]. On the other hand, it was lower than that reported by others [23,34,35]. Concerning age, the mean value of gingival index was found to be increased with age. The same finding was reported by some studies [20,23,24]. The increase in gingivitis with advancing age could be explained by the increase in the amount of dental plaque with age [20,23] and it was proven by different observational and experimental studies that dental plaque is a prime inducer of gingivitis [30] and these both conditions get worse with age [36].

In this study, the prevalence of enamel anomalies for the total sample was higher than that reported by other studies [37,38], while it was lower than that recorded by others [39-41]. It is important to mention that these studies differed in sample size, gender, and location of the studies. The variation in the prevalence may be due to different classifications of indices used, different field settings and technical examination procedures, such as lighting or the teeth were dried or not, and factors in the population, such as genetic, racial, ethnic and socioeconomic status [42,43]. Several etiological factors have been implicated as being responsible for enamel defects in the permanent teeth, and it was found that The increased enamel defects risk in permanent teeth is probably related to the critical period of amelogenesis from birth to two years of age, when the child is particularly vulnerable to a number of systemic conditions that can affect enamel development [10]. Although the etiology of enamel defects in permanent teeth may be attributed to local factors such as damage (trauma

or infection) to its primary predecessor, systemic factors such as malnutrition, resulting in an insufficient supply of indispensable components (mineral salts, proteins and vitamins), genetic, or environmental factors, most are likely to be multifactorial in nature [44,45]. Additionally, some authors stated that systemic conditions, such as prenatal or perinatal illness, low birth weight, regular antibiotic consumption, and respiratory disorders, are associated with dental enamel defects [46,47], however, further studies are needed concerning studying the causes and factors related to enamel defect among those students.

In the present study, diffused opacity was the most common type of enamel defects. The same finding was reported by some studies [38,48,49]. Enamel opacities involve changes in color and opacity of enamel, indicating differences in quality of enamel [50]. The defective enamel is of normal thickness and at eruption has a smooth surface [51]. It is believed that diffused defects result from a long, continuous low-grade insult. It was found that these defects were produced by a daily low dose of fluoride for a period of six months [52], however, this explanation need to be confirmed in further studies concerning the assessment of consumption and concentration of fluoride in water in Kirkuk city. Furthermore, other systemic factors operating over a long period of tooth development such as malnutrition [53] may mimic or augment the effects of fluoride. Diffuse opacities were associated with an arrest in enamel maturation characterized by delayed breakdown of amelogenins [54].

The most affected teeth with enamel defects in this study is the mandibular 1st molars, then central incisors. This finding came in accordance with a study in Nigeria [55], and this finding is partly explained by that the first permanent tooth which start calcification is the first molar, and this occurs around the time of birth, while the anterior teeth commence calcification between 4 and 6 months of age in a sequential order from the central incisor to the canine except the maxillary lateral incisor as calcification of this tooth occurs around 10–12 months of age [56]. The defect of enamel depends on the time of the stress affect the tooth, as during the formative stages, the tooth is one of the most sensitive organs in the body to systemic influences, this fact become more important when it is remembered that the enamel defect once formed cannot be repaired but remains for the entire life of the teeth [57].

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الخلاصة

المقدمة: التهاب اللثة هو واحد من الأمراض الفموية الأكثر شيوعا وانتشارا على نطاق واسع في المراهقين بعد تسوس الأسنان تحدث في كل من البلدان المتقدمة والنامية. الصفيحة الجرثومية هي العامل المسبب الرئيسي لالتهاب اللثة. مشكلة أخرى عن طريق الفم هي عيب المينا.

الهدف من هذه الدراسة تقييم صحة الفم (الصفيحة الجرثومية)، وتحديد نسبة انتشار وشدة التهاب اللثة وعيوب المينا بين طلاب المدارس الثانوية من ١٦-١٧ سنة في مدينة كركوك / العراق.

المواد والطرق: تتكون عينة الدراسة المتضمنة في الدراسة من (٧٥٠) طالبة في مرحلة الثانوية توزعت على (٣٨٧) طالبة في سن السادسة عشرة و (٣٦٣) طالبة في سن السابعة عشر، وتم اختيارهن عشوائيا من مختلف المدارس الثانوية للإناث في مدينة كركوك. تم تقييم الصفيحة الجرثومية باستخدام مؤشر من Sillness and Loe(١٩٦٤). تم تقييم صحة اللثة باستخدام مؤشر اللثة Loe and Sillness (١٩٦٣)، في حين تم تحديد حالات تشوهات المينا وفقا لمعايير منظمة الصحة العالمية (١٩٩٧).

النتائج: بلغ متوسط قيمة الصفيحة الجرثومية للعينة الكلية (٠,٩٢ ± ٠,٠٢). وكان انتشار التهاب اللثة (٨٨,٥٣٪) وكان متوسط قيمة مؤشر اللثة (٠,٩٠ ± ٠,٠٢). وفيما يتعلق بالعمر، ازداد متوسط قيمة مؤشر اللثة مع تقدم العمر مع عدم وجود فروق معنوية (P>0.05). أظهرت النتائج وجود علاقة إيجابية و ذات دلالة إحصائية عالية بين الصفيحة الجرثومية والتهاب اللثة للعينة الكلية ولكلا الأعمار((P-value<0.01). فيما يتعلق بعيوب المينا، كان انتشار عيوب المينا في العينة الكلية (٤٠,٢٧٪) وكان (العتامة المنتشرة) هو النوع الأكثر انتشارا من تشوهات المينا (٣١,٢٪). بينما كان النوع الأقل انتشارا هو نوع (العتامة المنتشرة ونقص تنسج الميناء). وكانت الأضراس السفلى الأولى هي أكثر الأسنان تأثرا بتشوهات المينا.

الاستنتاج: في الدراسة الحالية، أشار ارتفاع معدل انتشار التهاب اللثة بين الطالبات في المدارس الثانوية إلى الحاجة إلى تطبيق البرامج الوقائية في المدارس وعلى مستوى المجتمع بين هؤلاء الطالبات لمنع المزيد من انتشار التهاب اللثة ويشمل ذلك التثقيف الصحي حول الأسنان وتحسين المعرفة للممارسات السليمة في نظافة الفم.