A Cross-Sectional Study to Evaluate the Prevalence and Severity of Gingivitis among High School Students in Erbil City, Iraq.

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Background and objective: There is an increase in the gingival inflammation without an associated increase in plaque level during puberty. This study aimed to find out the extensiveness and severity of gingivitis among high school students and its relation with the socioeconomic status in different areas of Erbil city.

Materials and methods: Cross-sectional study was conducted. A total of 300 students from both genders aged between (12-17) years old were selected from different areas of Erbil city consisting of 7 high schools. The data were collected with the aid of a questionnaire by direct interview. The gingival health condition was assessed using gingival index by Löe and Silness.

Results: The number of participants in public schools was (66%) of the total and private schools (34%). Regarding tooth brushing, most of the students in public schools brushed once daily (44%), while in private schools they mostly brushed twice daily (41.7%). The moderate severity of gingivitis was the highest among students in general (85.3%). The percentage of dental visits in private schools was higher than that of students in public schools (28.78%). Gingival index for public schools was (1.62) and in private schools (1.43). In general, males show a higher Gingival Index compared to females.

Conclusion: The high prevalence of gingivitis shows us there's a need for educational programs to improve the awareness and attitude towards better oral hygiene practices and the students belonging to lower socioeconomic were more affected by gingivitis. In conclusion, gingival disease was slightly more prevalent in public schools than in private schools.

Keywords: Gingival index, pubertal gingivitis, tooth brushing frequency, oral hygiene practice.

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INTRODUCTION

The gingiva is the visible part of the periodontium inside the oral cavity, it is coral pink in color, and the gingiva is separated from the oral mucosa by a mucogingival junction.[1]

Gingivitis is the presence of gingival bleeding in at least one site. Is the mildest form of periodontal disease and is the commonest of all the diseases of the periodontium.[2] Gingivitis is an inflammation of the gingiva, mostly caused by bacterial plaque. In contrast to periodontitis, there is no clinical attachment loss (CAL) and as a result no migration of the junctional epithelium. The inflammation is un only at the gingival epithelium and the connective tissue.[3]

There are many types of gingivitis based on the clinical presentation, duration, extensiveness, and cause of infection, the most commonly observed types are plaque-induced, hormonal, acute ulcerative necrotizing, drug-induced, or spontaneously presenting hyperplastic gingivitis.[4]

Clinically, the gingival tissues are characterized by swelling, redness, tenderness, shiny surface, and bleeding upon gentle probing, gingivitis rarely results in

unprovoked bleeding and it rarely causes pain, as a result, many patients don't recognize the disease, and fail to manage it early.[5] It is more common in males when compared to females since it has been found that females tend to follow a better oral care regime, it is commonly seen in children and adults as well. Studies have shown gingivitis to be more prevalent in people with low socioeconomic status, as people with higher socioeconomic status tend to show a more positive attitude in maintaining oral hygiene in addition to having a better access to health care options. Studies reveal that gingivitis is more common in pregnancy, moreover, more severe forms of gingivitis have been found more prevalent in pregnant women.[6]

Gingival enlargement, one of the frequent features of gingival disease, is an increase in the size of the gingiva. It is a multifactorial condition that develops as a response to noxious stimuli because of unfavorable interactions between the host and the environment.[7] The types of gingival enlargement can be classified according to the causative factors and pathologic changes as follow: inflammatory gingival enlargement (Acute and Chronic), Drug-induced gingival Enlargement (Drugs like anticonvulsants, immunosuppressant and calcium-channel blockers), systemic disease (Leukemia, granulomatous diseases) or conditioned gingival enlargement (Pregnancy, puberty, Vitamin C deficiency, plasma cell gingivitis, nonspecific conditioned enlargement), Neoplastic enlargement (benign tumors, malignant tumors), and False enlargement (osseous lesions, dental tissues).[8]

Gingivitis can occur at any age but it mostly occurs at the age of puberty. Puberty marks the beginning of changes from maturation into adulthood. It is associated with a major increase in the secretions of the sex steroid hormones: testosterone in males and estradiol in females. As an adolescent, many changes occur throughout the body, puberty is not only important in the reproductive system, but in the periodontium as well. Puberty changes the way one's gingival health appears, making it more prone to having increased GCF (gingival crevicular fluid), gingival index, and BOP (bleeding on probing).[9]

Sex hormones influence cellular proliferation, differentiation, and the growth of tissues. A female's body, between the ages of 12 and 18 years old, undergoes many changes due to the fluctuating levels of estrogen and progesterone causing physiological changes. These changes cause significant effects on the tissues in the oral cavity such as the gingiva, periosteal fibers, fibroblasts, and periodontal ligaments. The sex hormones also suppress the action of the epithelial barrier causing it to be less defensive against bacteria. The body's immunological factors are also altered by these hormones, and at puberty, the production of estrogen and progesterone increase to a level that remains relatively sustained throughout the normal female reproductive phase; several studies have shown that increased sex-hormone levels correlate with an increased severity of gingivitis. Gingival tissues and the subgingival microflora respond with different changes to an increase in hormone levels at the onset of puberty.[10]

Microbial changes reported during puberty can be attributed to the changes in the microenvironment seen in the gingival tissue in response to the sex hormones, as well as the tendency of a specific bacteria to proliferate due to the higher concentration of hormones present.[11]

The aim of this study is to evaluate the prevalence and severity of gingivitis among private and public high school students and relate the findings to the socioeconomic status of students, age, gender, oral hygiene practice, and dental visits.

SUBJECTS AND METHODS

The study included an evaluation of the gingival health among students of high schools during puberty. The study started from October 2022 to January 2023. A total of 300 students ranging from 12-17 years old (male and female) from 7 different schools in Erbil city were included in this study. Ethical approval was obtained from the Periodontics department and deanship of Hawler Medical University - College of Dentistry. Consent was obtained from all the schools after explaining in detail the en-

tire research protocol. Data was collected by direct examination of students using mouth mirror and periodontal probe and recorded in a questionnaire designed to assess the history taken from the students with name, age, sex, grade, tooth brushing and frequency of tooth brushing, past dental visit, and finally an examination of the

Figure 1: Checking the gingival bleeding with the UNC probe.

gingiva with a periodontal probe (UNC probe) and disposable mirror for the gingival index only. (Figure 1).

To check the appearance of gingiva on mesial, facial, distal, and lingual surfaces of the Ramfjord teeth for any swelling, redness, and bleeding on probing and giving each surface a score of 0-3 depending on the severity of the inflammation present then adding all the scores of all the surfaces examined and dividing the total by the number of the surfaces examined which were 24.

Statistical Analysis. All the data was entered, analyzed and digitally stored with the Microsoft Excel program 2016, which was performed using tables and charts done in private and public high school students.

RESULTS

The present study is a cross-sectional examination, which was conducted among high school students. A total number of 300 students between 12 and 17 years old were examined. Regarding gender, most of the students in our study were males (67.3%), as samples were randomly selected. Regarding age, most of the students in our study were between the age group of 14 and 15 years old which was (58.4%), this is because it's the average age of puberty, while the percentage of participants between 16 and 17 years old was (40%), finally the percentage of students between age 12 and 13 years old was the least in our research which was (1.6%). Regarding school participation, the majority of students in our

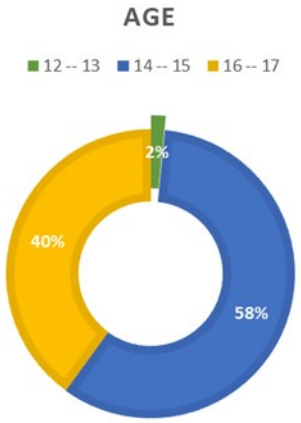

Figure 2. Shows the percentage of participants from different age groups.

study were from public schools which were (66%), while in private schools the percentage of participation was (34%).

The main finding of our study showed (85.3%) had moderate gingivitis and (9.7%) had severe gingivitis in both private and public schools. And most of the students of public and private schools had moderate gingivitis as it was (85.85%) and (84.31%) respectively, while students of public and private schools who had mild gingivitis were (1%) and (12.74%) respectively, and those of severe gingivitis were lowest in

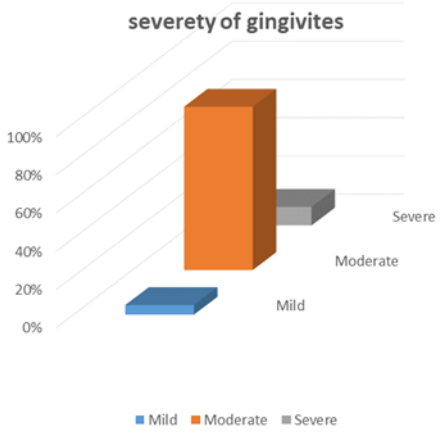

Figure 3. Shows the Prevalence and severity of gingivitis among high school students in Erbil city.

private schools which were (2.94%) while in public schools it was (13.13%).

The percentage of students in private schools that answered yes to tooth brushing was (95%) which was more than those students who answered no (5%). while in public schools the percentage of students that answered yes was less than those in private schools which was (70%) and the ones who answered no were (30%).

Regarding the frequency of tooth brushing the results showed brushing twice daily was more common in private schools as compared to public schools. However, the number of students in private schools that brush their teeth once and twice daily was similar to (41.7%), while brushing thrice daily was (12.7%). In public schools on the other hand, the results showed the percentage of the students that brush once daily (44.4%), while the students who brush twice daily (19.6%), and finally those who brush thrice daily (2.02).

The frequency of dental clinic visits in private schools that answer yes was (56.86%), and those that answered no were (43.13%). In public schools, the percentage of students that answer yes was (28.7%), and those that answered no were (71.21%).

Regarding gender variations, this study showed that the gingival health in females was better than in males, this study showed that there was no significant difference in private schools regarding the GI and it was almost equal to each other for males the mean was (1.45) while for females the mean was (1.4). In public schools the study showed that there is very little difference in males the mean was (1.68) while in females was (1.5) This gender difference is due to the fact that females brush their teeth more effectively than males because they care more about their appearance.

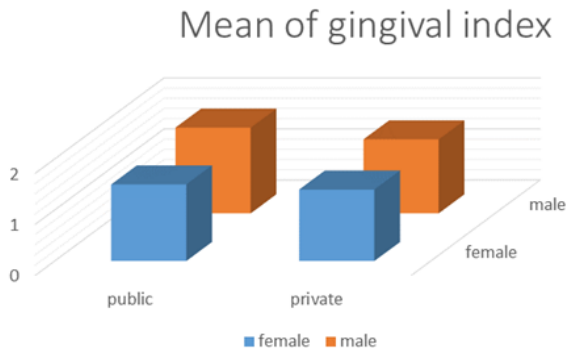

Figure 4. Shows the Comparison of the mean gingival index between males and females in public and private schools.

DISCUSSION

The present study is a cross-sectional examination, which was conducted among high school students. The current study aimed to assess the prevalence and severity of gingivitis in high school students in Erbil City. Regarding gender, most of the students in this study were males, as samples were randomly selected, and this is opposite to a previous study in Jordan conducted by Rodan et al,.[12] in which the majority were females. Regarding age, most of the students in the current study were between the age group of 14 and 15 years old, as it's the average age of puberty. Regarding school participation, the majority of students in our study were from public schools; this is because Erbil City has more public schools than private schools, additionally, public schools have more student frequency than private schools.

The main finding of this study showed that most of the students had moderate gingivitis, this is related to the parents' level of education regarding oral health, and hormonal effects during puberty; while students of public schools had higher levels of severe gingivitis than private schools. These results are similar to the results of other parts of the world of similar cultural and socioeconomic status. The prevalence of gingivitis in this study was very similar to that reported by Bhayat and Ahmad among students aged 12 years in Medina, Saudi Arabia.[13]

Regarding tooth brushing, this study showed the importance of socioeconomic background in determining children's tooth brushing behavior. Children in public schools reported a higher percentage of inadequate oral hygiene than children from private schools, similar results were obtained by Rajab et al study as well.[14] Farah and Ghandour, have described superior gingival and oral health among pediatrics of highly educated parents.[15]

Applied to the current location, this means that the gingival health of the overall people of Kurdish students in Erbil city of the same age group might be worse than this study has shown, which increases concern for the need for more oral health education. This study indicates the children are aware of oral hygiene but lack complete formal education on oral hygiene practices. The frequency of tooth brushing was twice more common in private schools as compared to public schools. Tooth brushing remains the mainstay of oral health measures universally.[16]

The frequency of dental clinic visits in private schools is higher than in public schools, this is because Students belonging to a higher socioeconomic status have better access to health options, and have a better attitude toward oral hygiene maintenance. Urban areas show a higher level of parental education, which affects their oral health knowledge that can determine the frequency of their children's dental visits; these findings agree with the Kashetty et al study.[8]

In epidemiological studies, the level of oral hygiene and gingival inflammation were widely evaluated by the measure of the gingival index[17]. This assessment is properly reproducible, very easy to use and examine, and can be carried out rapidly with great reproducibility and the least need for training. In the current study, the mean of the gingival Index reflects that the oral hygiene measurements were less in private than in public schools. This may be related to the socioeconomic status which is closely associated with oral health knowledge, attitudes, and behaviors that agrees with Kashetty et al study.[6]

Regarding gender variations, this study showed that the gingival health in females was better than in males, this gender difference is related to the fact that females brush their teeth more effectively than males, because they care more about their appearance; i.e., gingival health was worse in males, which agree with Al-Haddad et al study.[17]

The current study had some limitations: first, the design as a cross-sectional study, and time sequence could not be proved, and therefore evidence of causality requires more longitudinal research. Secondly, the prevalence of dental visits and frequency of tooth brushing in this study might have been underestimated because it was a self-reported method. The schools included in this study however, were randomly selected and the students from the selected schools were also selected by stratified random sample. These results of random method in selecting students from private and public high schools, if applied in several regions may allow generalization of the conclusion of this study in Erbil city.

CONCLUSION AND RECOMMENDATION

The results of the current study revealed that there is a difference in gingival health status in adolescents of puberty age, it showed that the GI average of high school students in Erbil City was the highest in public schools. It is recommended to pay greater attention to the "quality" of teeth

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