

Oral health in relation to nutritional status among 10 years old primary school children in Al-Hillah city/ Iraq

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ABSTRACT

Background: Oral health and nutrition are in interdependent relationship that good nutritional health enhancing good oral health. Nutrition can affect the development and integrity of oral cavity and the progression of oral disease. The aim of the present study was to assess the prevalence of the gingival health condition in relation to the nutritional status, among 10 years old primary school children in urban and rural area in Al-Hillah city.

Material and method: Eight hundred ninety one (891) students, aged 10 years old, selected randomly from different primary schools, in urban and rural area in Al-Hillah city, were included in this study. Oral examination including of plaque index assessment, which was done according to the criteria by Silness and Loe, in 1964, gingival health conditions was determined according to Loe and Silness, 1963. Nutritional status was assessed using body mass index (BMI), following the criteria of Centers for Disease Control and Prevention growth chart (CDC). Statistical analysis was done using Kruskal Wallis test, Mann-Whitney U test and ANOVA, p-value of < 0.05 was considered as statistically significant.

Results: This study showed that the majority of the sample was found to be with normal gingival health condition. No significant difference was observed between the gingival index in relation to gender, or residence also, no significant result was found, between plaque and gingival index in relation to the nutritional status.

Conclusion: The majority of the sample with normal gingiva however the nutritional status had no significant effect on gingival health condition while the urbanization had an effect on oral hygiene

Keywords: children, condition, nutritional, oral hygiene. (Received: 15/8/2018; Accepted: 1/10/2018)

INTRODUCTION

Dental plaque is a non-mineralized soft bacterial deposit, which form and adhere firmly to the tooth⁽¹⁾. The accumulation of plaque enhanced gingivitis⁽²⁾.

Gingivitis is described as an inflammation of the marginal gingival tissues with no detectable loss of bone or connective tissue attachment, caused by local irritation of substances derived from microbial plaque accumulating on and near the cervical region of the teeth⁽³⁾. In most children, the process of gingival inflammation remains superficial^(2,4,5).

The role of diet and nutritional factors in the development of periodontal diseases remain vague, although adequate diet is important nutritionally to maintain host resistance and maintain the integrity of the periodontal tissues, but many recent studies failed to find an association between nutritional status and periodontal disease⁽⁶⁾.

Malnutrition can increase the susceptibility to periodontal disease directly or indirectly: by forming changes in the supporting soft tissue structures and by differences in the functional ability of saliva that will lead to alterations in the differentiation, development and maturation of gingival margin, attachment epithelia, periodontal

membrane and alveolar bone⁽⁷⁾. Some of previous Iraqi studies addressed the Prevalence of gingivitis and their relation to nutritional status⁽⁸⁻¹⁵⁾. Al-Galebi in 2011 reported higher percentage for the moderate amount of plaque in Al-Nassiryia Governorate⁽¹¹⁾. Al-Awadi in 2016 reported that, the higher percentage of the children (79.5%) demonstrated amount of plaque scores between 1.1-2 in Al-Dewaniya Governorate⁽¹²⁾. However other Iraqi studies were found no significant difference between males and females concerning plaque index such Al-Galebi, El-Samarrai, Hassan, and Droosh⁽¹¹⁻¹⁵⁾. Al-Galebi in 2011 reported moderate type of gingivitis among 9 -10 years -old in Al-Nassiryia city⁽¹¹⁾. As far as there is no previous Iraqi study concerning the assessment of oral health condition in relation to nutritional status among children aged 10 years old in AL-Hillah city this study was conducted.

MATERIALS AND METHODS

Eight hundred ninety one (891) children aged ten years old were selected randomly from different rural and urban primary schools in Al-Hillah city. According to the division of General Directorate of Education of Al-Hillah city, which classified the primary schools into urban schools that were located in the center of the city and rural schools that were located in the neighboring villages. The cross sectional random sample was calculated from the prevalence of previous studies by the formula as $n = ZP^2 (1-P) / (d)^2$ ⁽¹⁶⁾.

N= Sample size.

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Z=Z Statistics for the level of the confidence (at 95% confidence level, Z=1.96).

P= Prevalence of the proportion.

D=Precision (if the precision is 5%, d=0.05).

This study was done during the period from December 2018 to February 2019. A pre-study ethical approval was assigned, approval was taken from the General Directorate of Education of Al-Hillah city in order to achieve subject without obligation, also the children's parent consent form that was taken before starting the study.

Inclusion criteria: The selected students were with:

- No history of medication, (anti- inflammatory or antimicrobial therapy) within previous 3 months.
- No history of orthodontic treatment.
- No history of any systemic disease.

Oral examinations were performed according to the criteria of WHO, 1997⁽¹⁷⁾ that are the examination of the children done in an arranged area for maximum efficiency and cooperation. The most comfortable situation for the children was the sitting on a chair and the examiner standing behind the children's head as well as facing the opening through which sunlight enters as source of light for get good illumination. The instruments were used: plane mouth mirror; several pairs of tweezers; containers; gauze; periodontal probe; towel.

Plaque index assessment was done using Silness and Leo⁽¹⁸⁾. The six index teeth were selected to represent whole dentition, the examination started with buccal surface following by mesial, lingual and distal surfaces .

According to FDI⁽¹⁹⁾ teeth numbering system, these teeth are: 16, 12, 24, 36, 32, and 44 for permanent and 55, 52, 64, 75, 72, and 84 for primary teeth. Only fully erupted teeth were included and if the indexed tooth was missing or partially erupted, it was not replaced by the adjacent tooth. Gingival condition was assessed using gingival index according to Loe and Silness⁽²⁰⁾. The examination sequence was similar to that of used for the dental plaque.

Nutritional status was assessed according to body mass index (BMI) indicator by using anthropometric measurement (weight and height) then followed the criteria of Centers for Disease Control and Prevention growth chart (CDC)⁽²¹⁾. Children were weighted by a bathroom scale⁽²²⁾. From the child's weight and height, BMI index determined according to this formula⁽²²⁾:

$$\text{Body weight} / (\text{height})^2 = \text{BMI Kg/m}^2$$

The result of that formula was compared with the international reference values using CDC growth charts⁽²¹⁾. Statistical analysis was performed using

SPSS® Software (version 23.0 for Linux®). The statistical tests were used: Student's t-test; ANOVA; Mann-Whitney U test; Kruskal Wallis H test, p-value of < 0.05 was considered as statistically significant.

RESULTS

This study included a total of (891) school children aged (10) years, boys and girls constituted close proportions, with boys forming (50.28%) while girls (49.72%). Children living in urban areas constituted (57.58%) of the study sample, while the remaining (42.42%) children lived in rural areas, as illustrated in figure (1). Table (1) illustrates distribution of the total sample between the residences

Table 1: Distribution of the children according to gender by residency

Residence	Gender No. (%)		Total No. (%)
	Boys	Girls	
Urban	249 (55.58%)	264 (59.59%)	513 (57.58%)
Rural	199 (44.42%)	179 (40.41%)	378 (42.42%)
Total	448 (100%)	443 (100%)	891 (100%)

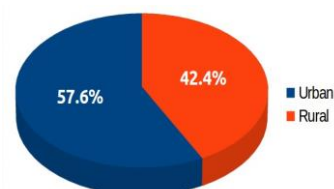


Figure 1: Residence of the sample

Table (2) demonstrates the mean value and standard Error of Plaque concerning both genders. Plaque evaluation was found to be even in both gender. No significant difference in plaque index was observed between boys and girls. Student's t-test was used because the data was normally distributed.

Table 2: Plaque Index (Mean and Standard Error) by gender

Gender	Plaque index		t-test	p-value
	Mean	SE		
Boy(no.=448)	0.69	0.04	0.71	0.475
Girl(no.=443)	0.72	0.04		
Total(no.=891)	0.70	0.03		

Table (3) demonstrates the mean value and standard Error of Plaque index concerning place

of residence. Plaque evaluation was found to be significantly higher in rural than urban area with a statistical significance.

Table 3: Plaque Index (Mean and Standard Error) by residence.

Residence	Plaque Index		t-test	p-value
	Mean	SE		
Urban (no.=513)	0.60	0.03	4.78	< 0.001
Rural (no.=378)	0.84	0.05		

Table (4) demonstrates the mean value and standard Error of plaque evaluation among children in regarding to the nutritional status. There was no statistical significant difference in plaque index value among the different categories of nutritional status.

Table 4: Plaque index by nutritional status.

Nutritional Status	Plaque Index		ANOVA F value	p-value
	Mean	SE		
Underweight (< 5th percentile) (no.=45)	0.67	0.11	1.37	0.252
Normal (5th-85th percentile) (no.=594)	0.74	0.03		
Overweight (85th-95th percentile) (no.=134)	0.65	0.06		
Obese (> 95th percentile) (no.=118)	0.61	0.06		

Table (5) demonstrates the prevalence of gingival inflammation and the distribution of children according to the severity of gingivitis. The majority of the sample was found to be with normal gingival condition followed by the mild type while the moderate and sever type were the lowest percentage.

Table 5: Distribution of the children according to the severity of gingivitis.

Severity of gingivitis	No.	%
Normal	720	80.81%
Mild	138	15.49%
Moderate	31	3.48%
Severe	2	0.22%

Table (6) demonstrates the mean values and standard error of gingival condition concerning both of gender and place of residency. In this

table Z score was used because the variables were not normally distributed. No significant relationship was observed between gingival index and any of gender, or residence. Mann-Whitney U test was used.

Table 6: Gingival index by gender and residence.

Variable	Gingival Index		Z	P-value	
	Mean	SE			
Gender	Boys	0.10	0.01	-	0.662
	Girls	0.09	0.01	0.44	
Residence	Urban	0.10	0.01	-	0.542
	Rural	0.10	0.01	0.61	

Table (7) demonstrates the mean values and standard deviation of gingival condition in regarding to nutritional status. Differences were statistically not significant between the nutritional status and the gingival index p-value (0.478). Kruskal Wallis H test was used.

Table 7: Gingival index by nutritional status.

Nutritional Status	GI Mean ± SD	Kruskal Wallis H	p-value
Underweight (< 5th percentile)	0.09 ± 0.27	2.49	0.478
Normal (5th-85th percentile)	0.10 ± 0.46		
Overweight (85th-95th percentile)	0.10 ± 0.34		
Obese (> 95th percentile)	0.09 ± 0.30		

DISCUSSION

Periodontal status of children was determined by using GI in this study. While PI determined the presence and the amount of the visible plaque accumulating on the supragingival area⁽¹⁸⁾, GI determine the extent and severity of gingival inflammation based on the assessment of the gingival color, contour and bleeding⁽²⁰⁾.

The mean of plaque index in this study was less than that reported by Al-Galebi in 2011⁽¹¹⁾; with matching age and also lower than other studies^(10, 8, 23, 24) but higher than that that reported by Al-Sadam in 2013⁽⁸⁾. These variations might be due to the differences in the sample size, residency (urban or rural), and knowledge.

Rural children showed a significantly higher mean of plaque index than that found among the urban

children, this was in agreement with the findings of the other studies (8,9,25,26). The result reflected the presence of poor oral hygiene among the rural children, which could be due to the low awareness level and the less use of oral hygiene aids in rural area than the urban one (27). In present study, there was no significant difference between boys and girls concerning of plaque index and this was in agreement with other studies (12-15). However, other studies (8,23,28-34,12) found that boys had statistically higher plaque index than girls. This difference could be due to the effect of many factors like; diet, oral hygiene, age, secretion of salivary gland could be effect on the amount of dental plaque, therefor the amount of plaque was vary among the individuals (4,35,36).

Result in this study showed that the prevalence of gingivitis was lower than that reported by previous Iraqi studies (11,12,15). It was assured that dental plaque is the main etiological factor for gingivitis (37).

In the present study, no significant difference was recorded for the gingival index among the nutritional status grades as well as gender, which could be attributed to the absence of the significant difference in plaque index; this finding was in agreement with that of Al-Sadam in 2013(9).

This may be related to that oral health problem is a multifactorial disease, including poor oral hygiene, dealing with tooth brush, frequencies visiting to the dentist, and diet (39).

CONCLUSION:

A largest percent of children had normal weight and healthy gingiva; there was no significant relation between the gingival index and the nutritional status of children while urbanization had significant effect on plaque index

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الخلاصة

خلفية الموضوع: التغذية وصحة الفم هما علاقة متازرة بمعنى الحالة الغذائية الجيدة تجعل صحة الفم جيدة. التغذية لها تأثير على تطور و سلامة التجويف الفمي وكذلك تقاوم امراض الفم الهدف من الدراسة الحالية هو تقييم الحالة الصحية للالتهاب اللثة وعلاقتها بالحالة الغذائية لاطفال مدارس الابتدائية لآعمار 10 سنوات في مدينة الحلة في العراق

المواد والطرق: تم اختيار 891 طلاب بعمر العشر سنوات عشوائيا من مختلف مدارس الابتدائية الريف والحضر في مدينة الحلة. يتضمن فحص الفم بتقييم الصفيحة الجرثومية حسب Loe and Silness, 1964 وتم تشخيص الحالة الصحية للثة حسب Loe and Silness, 1963. الحالة الغذائية تم تقييمها باستخدام القياسات الجسمية وفقا للرسم البياني للنمو تابعة لمراكز السيطرة عن الامراض والوقاية منا عام (2000). الاختبارات الاحصائية التي استخدمت هي: SPSS® Software (version 23.0 for Linux®). Student's t-test; ANOVA; Mann-Whitney U test; Kruskal Wallis H test.

النتيجة: نسبة عالية من الاطفال لديهم الصفيحة الجرثومية كانت النتيجة بفارق معنوي في اطفال الريف مقارنة باطفال مدارس المدن وايضا نسبة الرئيسية من العينة كانت لديهم صحة اللثة جيدة. لم تسجل أي فروق معنوية بين التهاب اللثة وكلا من المكان المعيشة ونوع الجنس والحالة الغذائية للاطفال. الاستنتاج: نسبة عالية من الاطفال لديهم اوزان طبيعية وهذا دليل على تطور الحالة الغذائية في مدينة الحلة.