Periodontal condition in relation to nutritional status among kindergarten children in Al-Ramadi city/Iraq

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ABSTRACT

Background: Nutrition can affect periodontal disease through contributing to microbial growth in the gingival crevice, affecting the immunological response to bacterial antigens and assisting the repair mechanism of the connective tissue at the local site after injury from plaque and calculus. The aim of this study was to assess the prevalence of Oral hygiene (plaque and calculus) and gingivitis in relation to age, gender and nutritional status.

Materials and methods: The sample included (444) kindergarten children at age of (4 and 5 years old) males and females from urban areas in Al-Ramadi city. The assessment of nutritional status was performed using anthropometric measurements (Waterlow's indicator). Plaque index of Silness and Loe (1964) used for plaque assessment, gingival index of Loe and Silness (1963) was used for recording gingival health condition. Ramfjord index teeth (1959) were applied to assess oral cleanliness and gingival condition.

Results: The mean value of plaque, Gingival and Calculus indices were found (1.64±0.02, 0.38±0.02, 0.0004±0.0002 respectively). Plaque index and gingival index were reported to be higher among malnourished children than well nourished described by Waterlow´s indicator, with statistically highly significant differences. No significant difference was recorded in calculus index between the malnourished and well nourished children.

Conclusions: There was a direct relationship between periodontal condition and malnutrition.

Key words: Periodontal condition, Kindergarten, Nutritional status, Al-Ramadi city. (J Bagh Coll Dentistry 2014; 26(3):129-132).

INTRODUCTION

Gingivitis is the most common type of periodontal disease that seen in children which may start early in life and may increase in severity with age [(1,2)]. Many studies revealed that malnutrition affects the severity and extent of periodontal disease and reported a positive relation between protein energy malnutrition and gingivitis among children [(3-6)].

The need for deeper understanding on the influence of protein energy malnutrition on the periodontal condition and there is no previous Iraqi studies concerning the relation between nutritional status and periodontal condition among kindergarten children in Al-Ramadi city, it was decided to conduct this study.

MATERIALS AND METHODS

This study was conducted among kindergarten children aged 4-5 years in Al-Ramadi city in Iraq. The total sample composed of (444) children who were chosen randomly from different kindergarten in the city. Permission was obtained from the Al-Ramadi education institution in order to meet subjects with no obligation, the purpose of the study was explained to the kindergarten authority to ensure full cooperation, and also special consents were distributed to parents to obtain permission for including their children in the study with full cooperation.

Children with serious systemic diseases and/or uncooperative were not examined. The assessment of nutritional status was performed using anthropometric measurements (Waterlow's indicator). Plaque index of Silness and Loe used for plaque assessment [(7)], gingival index of Loe and Silness was used for recording gingival health condition [(8)]. Ramfjord index teeth were applied to assess oral cleanliness and gingival condition [(9)]. Analysis and processing of the data were carried out using SPSS version 19, statistical tests used are ANOVA test and LSD test. P-values less than 0.05 were considered as statistically significant, while P-values less than 0.01 were recorded as a highly significant.

RESULTS

The mean value of plaque index was found (1.64±0.02). Mean plaque index according to nutritional status by age and gender is illustrated in Table (1, 2, 3, 4). These tables shows that for the total sample the mean plaque index was higher among short term, dwarf and long term children than well nourished described by Waterlow´s indicator, with statistically highly significant differences ($p < 0.01$). Data analysis in each age and each gender showed that the highly significant difference is found among total female, total male, total 4 years and total 5 years described by Waterlow´s indicator. Mean calculus index for the total sample was found (0.0004±0.0002). Mean calculus index according to nutritional status by age and gender is illustrates in Table (5). This table shows that for

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the total sample the mean calculus index was higher among well nourished and dwarf children than short term and long term children described by Waterlow´s indicator, with statistically no significant differences ($p > 0.05$).

Data analysis in each age and each gender showed that the mean calculus index was higher among 5 years than among 4 years with no significant difference, on the other hand, total normal males had mean calculus index higher than total normal females and the opposite picture was seen regarding dwarf children with no significant difference ($p > 0.05$).

The mean value of gingival index for the total sample was found (0.38±0.02). Mean value of gingival index according to nutritional status indicators by age and gender is shown in Tables (6, 7, 8, 9, 10). The mean value of gingival index for the total sample among short term, dwarf and long term children were found to be higher than well nourished children described by the Waterlow´s indicator, with statistically highly significant difference ($p < 0.01$).

Data analysis showed that the well nourished, dwarf and long term males had mean gingival index higher than well nourished, dwarf and long term females and the opposite picture was seen regarding long term children. For all nutritional grades the mean gingival index was higher among children aged 4 years than among 5 years with significant difference.

Table 1: Plaque index according to nutritional status indicator by age and gender

Age (year)	Gender	Nutritional status																Comparison	
		Normal				Short term				Dwarf				Long term					
		No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	d.f.	F-value
4	Males	62	1.65	0.07	0.57	7	2.08	0.17	0.46	20	1.98	0.09	0.42	9	2.10	0.18	0.54	3	3.822*
	Females	70	1.64	0.07	0.64	6	1.96	0.20	0.49	23	2.12	0.07	0.37	7	1.64	0.17	0.46	3	4.28**
	Both	132	1.65	0.05	0.61	13	2.03	0.12	0.46	43	2.05	0.06	0.39	16	1.90	0.13	0.55	3	6.977**
5	Males	122	1.49	0.05	0.56	0	/	/	/	8	1.88	0.19	0.54	5	1.60	0.30	0.69	2	N.S
	Females	80	1.39	0.06	0.59	6	2.26	0.11	0.28	13	1.99	0.13	0.48	6	2.01	0.17	0.43	3	9.421**
	Both	202	1.45	0.04	0.57	6	2.26	0.11	0.28	21	1.95	0.10	0.49	11	1.82	0.17	0.57	3	9.588**
Total	Males	184	1.54	0.04	0.57	7	2.08	0.17	0.46	28	1.95	0.08	0.45	14	1.92	0.16	0.62	3	7.308**
	Females	150	1.51	0.05	0.62	12	2.11	0.11	0.41	36	2.07	0.06	0.41	13	1.81	0.13	0.47	3	12.329**
	Both	334	1.53	0.03	0.59	19	2.10	0.09	0.42	64	2.02	0.05	0.43	27	1.87	0.10	0.55	3	19.591**

NS Non-significant P>0.05, * Significant P<0.05, ** Highly significant P<0.01

Table 2: LSD according to nutritional status indicator for four years of age

Nutritional status	Male		Female		Both	
	S.E	Sig.	S.E	Sig.	S.E	Sig.
Normal-short term	0.21	0.04	0.24	0.19	0.16	0.02*
Normal-dwarf	0.13	0.02	0.13	0.001**	0.09	0.00**
Normal-long term	0.19	0.02	0.22	0.97	0.14	0.09
Short term-dwarf	0.23	0.66	0.26	0.55	0.17	0.87
Short term-long term	0.27	0.94	0.32	0.31	0.20	0.53
Dwarf-long term	0.21	0.57	0.25	0.05	0.16	0.33

*** Significant P<0.05, ** Highly significant P<0.01**

Table 3: LSD according to nutritional status indicator for the five years of age

Nutritional status	Female		Total	
	S.E	Sig.	S.E	Sig.
Normal-short term	0.23	0.00**	0.23	0.001**
Normal-dwarf	0.16	0.001**	0.12	0.000**
Normal-long term	0.23	0.01*	0.17	0.03*
Short term-dwarf	0.27	0.32	0.26	0.23
Short term-long term	0.32	0.44	0.28	0.12
Dwarf-long term	0.27	0.93	0.21	0.55

*** Significant P<0.05, ** Highly significant P<0.01**

Table 4: LSD according to nutritional status indicator to the total number of age

Nutritional status	Male		Female		Both	
	S.E	Sig.	S.E	Sig.	S.E	Sig.
Normal-short term	0.23	0.30	0.14	0.000**	0.13	0.00**
Normal-dwarf	0.12	0.04*	0.09	0.19	0.07	0.02*
Normal-long term	0.16	0.006**	0.14	0.19	0.11	0.004**
Short term-dwarf	0.25	0.97	0.16	0.000**	0.14	0.005**
Short term-long term	0.27	0.43	0.19	0.002**	0.16	0.13
Dwarf-long term	0.19	0.28	0.15	0.68	0.12	0.21

*** Significant P<0.05, ** Highly significant P<0.01**

Table 5: Calculus index according to nutritional status indicator by age and gender

Age (year)	Gender	Nutritional status																Comparison	
		Normal				Short term				Dwarf				Long term					
		No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	d.f.	F-value
4	Males	62	0.0000	0.0000	0.000	7	0	0	0	20	0.0000	0.0000	0	9	0	0	0	/	/
	Females	70	0.0000	0.0000	0.000	6	0	0	0	23	0.0000	0.0000	0	7	0	0	0	/	/
	Both	132	0.0000	0.0000	0.000	13	0	0	0	43	0.0000	0.0000	0	16	0	0	0	/	/
5	Males	122	0.0005	0.0004	0.005	0	/	/	/	8	0.0000	0.0000	0	5	0	0	0	2	N.S
	Females	80	0.0000	0.0000	0.000	6	0	0	0	13	0.0077	0.0077	0.027	6	0	0	0	3	N.S
	Both	202	0.0003	0.0003	0.004	6	0	0	0	21	0.0048	0.0047	0.021	11	0	0	0	3	N.S
Total	Males	184	0.0003	0.00033	0.004	7	0	0	0	28	0.0000	0.0000	0	14	0	0	0	3	N.S
	Females	150	0.0000	0.000	0.000	12	0	0	0	36	0.0028	0.0027	0.01	13	0	0	0	3	N.S
	Both	334	0.0002	0.0002	0.003	19	0	0	0	64	0.0016	0.0015	0.012	27	0	0	0	3	N.S

NS Non-significant P>0.05

Table 6: Gingival index according to nutritional status indicator by age and gender

Age (year)	Gender	Nutritional status																Comparison	
		Normal				Short term				Dwarf				Long term					
		No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	No.	Mean	±S.E	S.D.	d.f.	F-value
4	Males	62	0.46	0.09	0.71	7	0.58	0.25	0.67	20	0.64	0.15	0.69	9	1.24	0.31	0.94	3	3.021*
	Females	70	0.32	0.06	0.50	6	1.41	0.33	0.83	23	0.42	0.09	0.43	7	0.51	0.24	0.65	3	8.109**
	Both	132	0.39	0.05	0.61	13	0.96	0.23	0.83	43	0.52	0.08	0.57	16	0.92	0.22	0.88	3	5.866*
5	Males	122	0.28	0.04	0.44	0	/	/	/	8	0.46	0.21	0.59	5	0.01	0.01	0.03	2	N.S
	Females	80	0.22	0.04	0.42	6	0.71	0.32	0.80	13	0.33	0.12	0.43	6	0.39	0.15	0.38	3	N.S
	Both	202	0.26	0.03	0.43	6	0.71	0.32	0.80	21	0.38	0.10	0.49	11	0.22	0.10	0.33	3	N.S
Total	Males	184	0.34	0.04	0.55	7	0.58	0.25	0.67	28	0.59	0.12	0.66	14	0.80	0.25	0.96	3	3.766**
	Females	150	0.27	0.03	0.46	12	1.06	0.24	0.85	36	0.39	0.07	0.43	13	0.45	0.14	053	3	10.046**
	Both	334	0.31	0.02	0.51	19	0.88	0.18	0.81	64	0.47	0.06	0.54	27	0.63	0.15	0.79	3	9.569**

NS Non-significant P>0.05, * Significant P<0.05, ** Highly significant P<0.01

Table 7: LSD according to nutritional status indicator to the total number of four years of age

Nutritional status	S.E	Sig.
Normal-short term	0.18	0.002**
Normal-dwarf	0.11	0.22
Normal-long term	0.17	0.002*
Short term-dwarf	0.20	0.03*
Short term-long term	0.24	0.85
Dwarf-long term	0.18	0.03*

*** Significant P<0.05, ** Highly significant P<0.01**

Table 8: LSD according to nutritional status indicator to the total number of male

Nutritional status	S.E	Sig.
Normal-short term	0.23	0.30
Normal-dwarf	0.12	0.04*
Normal-long term	0.16	0.006**
Short term-dwarf	0.25	0.97
Short term-long term	0.27	0.43
Dwarf-long term	0.19	0.28

*** Significant P<0.05, ** Highly significant P<0.01**

Table 9: LSD according to nutritional status indicator to the total number of female

Nutritional status	S.E	P value
Normal-short term	0.1477	0.000**
Normal-dwarf	0.0914	0.19
Normal-long term	0.142	0.19
Short term-dwarf	0.1641	0.000**
Short term-long term	0.197	0.002**
Dwarf-long term	0.1593	0.68

*** Significant P<0.05,**
**** Highly significant P<0.01**

Table 10: LSD according to nutritional status indicator to the total number of age

Nutritional status	S.E	P value
Normal-short term	0.13	0.000**
Normal-dwarf	0.07	0.028*
Normal-long term	0.11	0.004**
Short term-dwarf	0.14	0.005**
Short term-long term	0.16	0.13
Dwarf-long term	0.12	0.21

*** Significant P<0.05,**
**** Highly significant P<0.01**

DISCUSSION

There is no previous epidemiological study concerning population in Al-Ramadi city, so results of the present study can be considered as a base line data for comparison with other studies in Iraqi governorates and different parts of the world. The results revealed that the mean plaque index among malnourished children (short term, dwarf and long term) were higher than among well nourished children, this finding is in agreement with previous Iraqi studies [5,10-12]. Malnutrition is an outcome of low socioeconomic condition [13] and these socioeconomic factors affect plaque index by leading poor brushing behavior and ignorance of malnourished children to their oral hygiene [14] also malnutrition may weaken the immune response leading to health problem and this may be associated with increased thickness of dental plaque [4].

In the present study, the result showed that both well nourished and malnourished children suffer from gingival inflammation but the prevalence and severity of gingivitis was recorded higher among malnourished groups than well nourished once. This result is in agreement with many studies [3,5,10-12]. They attributed the occurrence of gingivitis to the deterioration in nutritional status [15].

In the present study, calculus was present in a low percentage in both well nourished and mal nourished children with no significant difference but still well nourished children had a higher calculus index than malnourished of sure this is because poor brushing behavior and oral cleanliness among the well nourished or could be due to accumulation of dental plaque around the badly carious tooth as a sequence to unilateral chewing habit due to dental pain [3] but, we need further investigation to clarify this finding.

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