

Caries Experience in Relation to Weight Status among School Children Age 7-12 Year-old in Tikrit City

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Key words

Underweight,
Overweight,
BMI, WHO

Abstract

Caries is an infectious disease that is induced by the diet. Despite its decline in all age group on a worldwide basis, it is still a serious public health problem in children and its control should be a priority. It has demonstrated that dental caries can gradual reduce children's weight gain, which may be reversed after complete oral rehabilitation. The aim of this study was to investigate the association between age-specific body mass index (BMI-for-age) and dental caries among school children 7-12 years in Tikrit city.

Material and method: A random sample of 390 school going healthy children aged 7-12 years were selected from different schools located in the Tikrit city. Height and weight for each child was recorded to obtain BMI-for- age. Dental caries was recorded (dmft, dmfs, DMFT and DMFS) according to WHO criteria. The data obtained was subjected to statistical analysis.

The results showed that the underweight children were more likely to have caries experience than normal and overweight children for primary dentition (dmft 6.75 ± 0.56 and dmfs 17.21 ± 1.37) and for permanent dentition (DMFT 4.00 ± 0.58 and DMFS 6.48 ± 1.23) with statistically no significant differences between the three groups.

Introduction

Obesity and overweight are defined as having an excess of body fat related to lean mass, with multifactorial conditions involving psychological, biochemical, metabolic, anatomic and social alterations⁽¹⁾. Over weight and dental caries are both multifactorial diseases that impact children's health and psychosocial development⁽²⁾. Dental caries, otherwise known as tooth decay, is one of the most prevalent chronic diseases of people worldwide; individuals are susceptible to this disease throughout their lifetime⁽³⁾. Dental caries forms through a complex interaction over time between

acid-producing bacteria and fermentable carbohydrate, and many host factors including teeth and saliva⁽⁴⁾. The role of diet and nutrition in growth and dental caries is well known and poor growth, obesity and childhood caries are three substantial public health problems⁽⁵⁾. Relationship between poor growth and dental caries has been reported by many studies; the mean weight of children with carious teeth was less when they were compared with matched groups⁽⁶⁾. Improvement in growth factors was observed after dental rehabilitation in other studies which some indicators such as weight, height or BMI were compared before and after intervention⁽⁷⁾. On the other hand, obese children usually have a

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rich carbohydrate regime which could make them susceptible to more carious teeth⁽⁸⁾.

Under nutrition may exacerbate the development of dental caries in three ways. First, it contributes to the development of hypoplasia which in turn increases caries susceptibility. Secondly, it causes salivary gland atrophy, which results in reduced salivary flow and altered salivary composition. This reduces the buffering capacity of saliva and increases the acidogenic load of the diet. There is also evidence that deficiency of vitamin A causes salivary gland atrophy and a consequent reduced saliva flow. Thirdly, under nutrition delays eruption and shedding of teeth which affects the caries experience at a given age. Poorly nourished children have been shown to have 2-5 fewer teeth erupted compared to well-nourished children of the same age⁽⁹⁾.

Material and method

A random sample of 390 school going healthy children aged 7-12 years were selected from different schools located in the Tikrit city in 2013. The children with history of systemic diseases which may affect their growth were excluded. Height and weight for each child was recorded to obtain BMI-for- age. BMI of children were calculated as weight in kg divided by height in meter square (m^2) and then compared with WHO standard growth reference for the same age and gender⁽¹⁰⁾. Dental caries was recorded according to WHO criteria were decayed, missing and filled of primary teeth (dmft and dmfs) and permanent teeth (DMFT and DMFS) then children were categorized into three groups as follows: Underweight is defined as BMI-for-age less than 5th percentile, Normal-weight 5th percentile to less than the 85 percentile and Overweight which is equal to or greater than the 85 percentile⁽¹¹⁾. The data was analyzed as descriptive statistic includes frequency, percentage, mean, standard deviation, and standard error and for statistical analysis of the data using one- way ANOVA with LSD test to detect significance of relation between various variable. P-value <0.05 was

considered statistically as significant while p-value > 0.05 was considered statistically as not significant and p- value < 0.01 was considered as high significant.

Results:

The total sample consisted of 390 children (206 boys and 184 girls) aged between (7-12) years. The distribution of the total sample by age and gender are seen in table (1). The percentage of the total boys (52.82%) while the girls (47.18%). The majority of the children 281 (72.05%) had normal weight, while 23 (5.89%) were under weight and 86 (22.06%) were had over weight. Only three children are free from caries, one of them boy at aged nine years old with normal weight and the two others are girls with aged ten years old with overweight and twelve with normal weight. The mean value of caries experience for deciduous dentition (dmft) as shown in table (2) were found to be higher (7.61 ± 0.27) in normal weight with age group (7-9). The differences in mean value were recorded to be statistically high significant ($P=0.002$), while for the total samples the higher value of mean was shown in the underweight (6.75 ± 0.56) with statistically no significantly differences between three groups ($P=0.72$) as shown in table (2). The LSD test for age group (7-9) was found to be statistically no significant between normal and underweight (0.24 ± 0.89 , $P=0.98$), while statistically high significant differences between normal and over weight (1.97 ± 0.55 , $P=0.00$) and statistically significant differences between under and over weight (1.94 ± 0.97 , $P=0.04$). Table (3) illustrates the mean values of caries severity for deciduous dentition (dmfs), for the total sample the higher value of the mean was shown in the underweight group (17.21 ± 1.37) then in normal group (16.39 ± 0.55) finally in overweight group (15.13 ± 1.09) with statistically no significant differences between the three groups ($P=0.47$).

The mean value of DMFT was higher in total sample for the underweight group (4.00 ± 0.58) then in normal group

(3.90 ± 0.14) and the lowest value was shown in the overweight group (3.88 ± 0.29) with statistically no significant differences between the three groups ($P=0.98$). The mean values of caries severity for permanent dentition (DMFS) in the total sample was shown the higher value in the underweight group (6.48 ± 1.23) then in the overweight group (6.38 ± 0.52) finally in normal group (6.21 ± 0.27) with statistically no significant differences between the three groups ($P=0.93$) as shown in the tables (4 and 5).

Discussion

This study is concerned to be the first Iraqi study in Tikrit city that deal with caries experience in relation to weight status among school children. Results of the present study showed that (0.77 %) of the total sample were caries free and the total mean value of caries experience (dmft, dmfs, DMFT and DMFS) was shown higher in underweight children than in normal and overweight children with no statistically significant differences between the three groups. The dietary habits in children have suffered major changes in the last thirty years. Consumption of soft drinks is associated with reduced vitamin and mineral intake and an excess of dietary carbohydrates⁽¹²⁾. Advanced untreated dental caries can cause pain and discomfort and influence nutrition and growth in children⁽¹³⁾. Different mechanisms have been postulated on the relationship between dental caries and child growth⁽¹⁴⁾. First, untreated caries could affect children's ability to eat it and, subsequently impairs adequate intake of nutrients⁽¹⁵⁾. Infection from dental caries could also have impact on children growth⁽¹⁶⁾. Furthermore, severe dental caries can affect quality of life including ability to sleep which in turn impacts child growth⁽¹⁷⁾. On the other hand, others have suggested that the relationship between being underweight

and dental caries is confounded by inadequate nutritional intake⁽¹⁸⁾, as poor nutrition can increase susceptibility to dental caries due to altered saliva composition and impaired secretion⁽¹⁹⁾. Earlier studies have also suggested a relationship between malnutrition, enamel hypoplasia, dental caries, and tooth exfoliation⁽²⁰⁾. Others have also demonstrated that dental caries in primary dentition was associated with wasted and wasted and stunted children⁽²¹⁾.

Conclusion

The caries experience for deciduous dentition (dmft) were found to be higher in normal weight children with age group (7-9) and the differences in mean value were recorded to be statistically high significant ($P = 0.002$), while for total samples higher value of mean (dmft) was shown in underweight with statistically no significant differences between the three groups. The mean values of caries severity (dmfs) for deciduous teeth was shown higher in the underweight group (17.21 ± 1.37) then in normal group (16.39 ± 0.55) and the lowest value was shown in the overweight group (15.13 ± 1.09) with statistically no significant differences between the three groups.

The mean value of DMFT was higher in total sample for the underweight children and the lowest value in the overweight group with no statistically differences between the three groups ($P = 0.98$), while the higher value of DMFS was shown in the underweight and the lowest value in normal weight with statistically no significant differences between the three groups ($P = 0.93$).

Table (1) Distribution of the total sample according to the age, gender and weight.

Age group	gender	Examined children		Normal weight		Under weight		Over weight	
		No	%	No	%	No	%	No	%
7-9	boys	91	44.17	59	64.84	8	8.79	24	26.37
	girls	72	39.13	53	73.62	4	5.56	15	20.83
	total	163	41.79	112	68.71	12	7.36	39	23.93
10-12	boys	115	55.84	83	72.17	7	6.09	25	21.74
	girls	112	60.87	86	76.79	4	3.57	22	19.64
	total	227	58.21	169	74.45	11	4.84	47	20.70
total	boys	206	52.82	142	68.93	15	7.28	49	23.79
	girls	184	47.18	139	75.54	8	4.34	37	20.12
	total	390	100	281	72.05	23	5.89	86	22.06

Table (2) the dmft index (mean value, standard deviation and standard error) for the total sample according to the age groups and weight.

Age group	Normal weight			Under weight			Over weight			df	ANOVA value	P-Value
	mean	±SD	±SE	mean	±SD	±SE	mean	±SD	±SE			
7-9	7.61	2.91	0.27	7.58	1.88	0.54	5.64	3.26	0.52	2	6.62	0.002
10-12	4.82	2.59	0.22	4.44	1.94	0.64	5.07	2.84	0.52	2	0.22	0.80
Total	6.38	3.19	0.19	6.75	2.77	0.56	6.18	3.65	0.40	2	0.33	0.72

Table (3) caries severity for deciduous teeth dmfs (mean value stander deviation and stander error) for the total sample according to the age groups and weight..

Age group	Normal weight			Under weight			Over weight			df	ANOVA value	P Value
	mean	±SD	±SE	mean	±SD	±SE	Mean	±SD	±SE			
7-9	19.08	9.28	0.88	18.83	5.32	1.53	14.53	10.28	1.64	2	3.49	0.03
10-12	13.49	8.46	0.73	13.33	5.83	1.94	13.63	8.88	1.62	2	0.005	0.99
Total	16.39	9.20	0.55	17.21	6.70	1.37	15.13	9.90	1.09	2	0.75	0.47

Table (4) the caries experience for permanent dentition DMFT (mean value, standard deviation and standard error for the total sample according to the age groups and weight.

Age group	Normal weight			Under weight			Over weight			df	F	P-Value
	mean	±SD	±SE	mean	±SD	±SE	Mean	±SD	±SE			
7-9	2.81	1.36	0.13	3.00	1.28	0.37	2.92	1.33	0.21	2	1.75	0.84
10-12	4.79	2.64	0.20	5.09	3.56	1.07	5.04	3.24	0.47	2	0.19	0.82
Total	3.90	2.45	0.14	4.00	2.78	0.58	3.88	2.80	0.29	2	0.02	0.98

Table (5) the caries severity of permanent dentition DMFS (mean value, standard deviation and standard error) for the total sample according to the age groups and weight.

Age group	Normal weight			Under weight			Over weight			df	ANOVA value	P-Value
	mean	±SD	±SE	mean	±SD	±SE	Mean	±SD	±SE			
7-9	3.89	2.38	0.22	4.50	2.15	0.62	4.61	2.70	0.43	2	1.43	0.24
10-12	8.02	4.82	0.71	8.64	8.64	2.37	8.51	5.71	0.83	2	0.21	0.81
Total	6.21	4.53	0.27	6.48	5.91	1.23	6.38	5.03	0.52	2	0.07	0.93

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