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Impact of Residency Area on Dental Caries and Nutritional Status among 10 Years Old Children in Al-Hillah City, Iraq

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Abstract

The dental caries are still the most common oral disease affecting children through the world especially in developing countries as in Iraq; however, these are not life threating human disease.

This study was conducted to assess dental caries experience and the nutritional status among 10 years old primary school children in urban and rural area in Al-Hillah city.

Eight hundred ninety one (891) students, 10 years old, selected randomly from different primary school, in urban and rural area in Al-Hillah city. Oral examination of dental caries was done according to the criteria described by WHO in 1987. Nutritional status was assessed according to body mass index (BMI), then followed the criteria of Centers for Disease Control and Prevention growth chart (CDC).

A high percentage of total samples were affected with dental caries and significantly higher in urban areas than rural areas. The majority of children had normal weight and the lowest percentage had underweight

This study revealed that a higher prevalence of dental caries experience was recorded, in children of urban than children of rural areas. Therefore, there is need for an improving public and school preventive programs, and encouraged to orient health knowledge in a positive direction.

Keywords*: dental caries experience, urban and rural area*

Introduction

Dental caries can be defined as a demineralization of the inorganic part of the tooth with the dissolution of the organic substance based on interaction of several factors: diet (fermentable carbohydrate) oral micro flora (acidogenic bacteria), time and host [(1, 2).]

A variation in caries prevalence among different countries may be related to several factors, which include: water fluoridation, and dental education, as well as different dietary habit and socioeconomic status, age, gender, race, oral hygiene, and geographical location, all these factors if not available, may lead to higher caries prevalence among developing countries, and the reverse for developed one [(3).]

Iraq is one of the developing countries that showed as distressing increase in caries prevalence and severity [(4, 5).]

There are three mechanisms explained that malnutrition during tooth development can make teeth more susceptible to dental caries. The first is that malnutrition causes defectively formed tooth, the second one is that the eruption of teeth is delayed among malnourished children; the last mechanism is that malnutrition can lead to increased dental caries by affecting salivary gland development and function [(6, 7).] It was thought that provide good nutrition during teeth development was the principle way to prevent dental caries. It was known that the topical effect of diet in the mouth after the teeth have erupted plays a much more important role [(8).]

So, the aim of this study is assessing dental caries and nutritional status in children aged ten years in primary schools in Al-Hillah city.

Materials and Method

Subjects:

Eight hundred ninety one (891) children aged 10 years old selected randomly from different rural and urban primary schools in Al-Hillah city. The cross sectional random sample was calculated for prevalence studies by the formula as $n=ZP^2 (1-P)/d^2$ [9].

N= Sample size.

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 which taken before start the study.

Inclusion criteria: Students 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 on chairs in a special room, under good illumination by using dental mirror, probe and dental tweezers.

Diagnosis and recording of dental caries were carried out by the criteria of WHO in 1987 [10]. 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) [11]. Children were weight by bathroom scale [12]. From the child's weight and height, BMI index determined according to this formula [12]: **Body weight / (height) ^{2} = BMI Kg/m^2**

The result of that formula was compared with international reference values using CDC growth charts [11].

Results

This study included a total of (891) school children aged (10) years, children living in urban areas constituted (57.6%) of the sample, while the remaining (42.4%) children lived in rural areas, as illustrated in Table (1) illustrated distribution of total sample between the residences of children according to gender.

Table 1: Distribution the residence of the sample by gender

Residence	Total No. & (%)
Urban	513 (57.58%)
Rural	378 (42.42%)
Total	891 (100%)

Table (2) illustrated distribution of the children by nutritional status between urban and rural residence. Urban residents have shown slightly higher percentage of underweight nutritional status than rural residents (5.26% vs. 4.76%). It had also shown a highly significant relationship, chi-square = 36.06, d.f. = 3, P-value < 0.001.

Table 2: Distribution of nutritional status by residence

Residence	Nutritional Status No. (%)				P-value
	Underweight (< 5th percentile)	Normal (5th-85th percentile)	Overweight (85th-95th percentile)	Obese(> 95th percentile)	
Urban (n=513)	27 (5.26%)	302 (58.87%)	100 (19.49%)	84 (16.37%)	< 0.001
Rural (n=378)	18 (4.76%)	292 (77.25%)	34 (8.99%)	34 (8.99%)	
Total (n=891)	45 (5.05%)	594 (66.67%)	134 (15.04%)	118 (13.24%)	

Table (3) illustrates the mean value and standard deviation of caries experience by fractions in primary dentition among children in regarding to place of residence. The result revealed that primary missing surfaces (ms) were significantly higher in rural areas, while primary filling surfaces (fs) were significantly higher in urban area.

Table 3: Caries experience of primary teeth with fractions by residency

Variable	Residence	Mean ± SD	Z	P-value
dmft	**Urban**	3.01 ± 2.40	-0.62	0.539
	Rural	2.89 ± 2.32		
dmfs	**Urban**	7.05 ± 6.96	-1.11	0.267
	Rural	7.59 ± 6.98		
ds	**Urban**	5.32 ± 5.52	-1.27	0.204
	Rural	5.74 ± 5.56		
ms	**Urban**	1.52 ± 4.27	-2.68	**0.007**
	Rural	1.95 ± 4.02		
fs	**Urban**	0.16 ± 1.08	-3.53	**< 0.001**
	Rural	0.02 ± 0.23		

Table (4) illustrates the mean value and standard deviation of caries experience by fractions in primary dentition among children in regarding to nutritional status. It was found that primary teeth (dmft, dmfs, and ds) had a statistically significant relationship with nutritional status. Underweight children had significantly higher dmft, dmfs, and ds than other.

Table 4: Caries experience with fractions in primary dentition by nutritional status

Table (5) demonstrates the mean value and standard deviation of caries experience by fractions in permanent dentition among children in regarding to place of residence. Caries experience was found to be higher in urban area than rural area. DMFT, DMFS, Ds and Fs of permanent teeth were significantly higher in urban areas compared to rural areas while mean value missing surface was higher in rural area than urban.

Table 5: Caries experience with fractions in permanent dentition among children by residency

Variable	Residence	**Mean ± SD**	**Z**	**P-value**
DMFT	**Urban**	**0.59 ± 0.84**	-5.42	**< 0.001**
	Rural	**0.33 ± 0.69**		
DMFS	**Urban**	**0.87 ± 1.72**	-5.05	**< 0.001**
	Rural	**0.63 ± 1.90**		
DS	**Urban**	**0.74 ± 1.49**	-4.89	**< 0.001**
	Rural	**0.53 ± 1.72**		
MS	**Urban**	**0.07 ± 0.58**	-0.04	0.965
	Rural	**0.09 ± 0.85**		
FS	**Urban**	**0.05 ± 0.40**	-2.15	**0.031**
	Rural	0.01 ± 0.11		

Table (6) demonstrates the mean value and standard deviation of caries experience by fractions in permanent dentition among children in regarding to nutritional status. Correlations between BMI percentile and each of DMFT and DMFS were assessed using Pearson's product-moment correlation coefficient; there was no significant correlation between BMI percentile and any of DMFT or DMFS, with correlation coefficient (R) of 0.04 and -0.02 respectively.

Table 6: Caries experience with fractions in permanent dentition among children by nutritional status

Variable	Nutritional Status	Mean ± SD	Kruskal Wallis H	P -value
DMFT	Underweight (< 5th percentile)	0.42 ± 0.66	2.99	0.393
	Normal (5th-85th percentile)	0.47 ± 0.80		
	Overweight(85th-95th percentile)	0.43 ± 0.71		
	Obese (> 95th percentile)	0.60 ± 0.89		
DMFS	Underweight (< 5th percentile)	0.60 ± 1.14	2.23	0.525
	Normal (5th-85th percentile)	0.82 ± 2.01		
	Overweight (85th-95th percentile)	0.60 ± 1.33		
	Obese (> 95th percentile)	0.75 ± 1.28		
DS	Underweight (< 5th percentile)	0.49 ± 0.92	3.68	0.298
	Normal (5th-85th percentile)	0.69 ± 1.77		
	Overweight (85th-95th percentile)	0.51 ± 1.24		
	Obese (> 95th percentile)	0.69 ± 1.14		
MS	Underweight (< 5th percentile)	0.11 ± 0.75	2.81	0.421
	Normal (5th-85th percentile)	0.10 ± 0.82		
	Overweight (85th-95th percentile)	0.00 ± 0.00		
	Obese (> 95th percentile)	0.04 ± 0.46		
FS	Underweight (< 5th percentile)	0.00 ± 0.00	2.88	0.410
	Normal (5th-85th percentile)	0.03 ± 0.26		
	Overweight (85th-95th percentile)	0.09 ± 0.58		
	Obese (> 95th percentile)	0.02 ± 0.18		

Discussion

The result was shown dmft for primary dentition lower than that seen by Al-Galebi in 2011 matching with age [5]. However, this results higher than other previous Iraqi studies by Al-Azawi in 2000 and Radhi in 2009 [13, 14]. The mean dmfs value of this study was lower than that seen by Diab in 2003 in the central region of Iraq [4], Droosh in 2007 in Sulalmania city [15], and Al-Galebi in 2011 in Al-Nassiyria city [5].

The mean DMFT value of the present study was lower than that seen by Al- Azawi in 2000 [13], Al-Galebi in 2011 [5], Laith and Al-Rawi in 2016 [16]. The result of DMFS was lower than reported by Ali in 2001[17], Diab in 2003 [4], Al-Galebi in 2011 [5], and Laith and Al-Rawi in 2016 [16].

In present study, the result was shown the dmft/dmfs higher than DMFT/DMFS this result due to the selected age of schoolchildren in this study had been recently transitioned from primary to permanent dentition stage this mean most of permanent teeth were sound that are newly erupted there was no enough time to develop of dental caries [18].

Both dmft/dmfs; DMFT/DMFS were higher in urban area than rural area this result agrees with Al-Sayyab in 1989[19], Al-Azawi in 2000 [13], and finding from this study indicate that, dental caries considered as

a disease of civilization, in addition, rural area was well and natural nutritional status than urban area. This may affect mineralization of teeth and salivary composition, thus decreasing the susceptibility of teeth to dental caries [20].

This study was shown that the decayed (ds/Ds) was the major component of dmfs /DMFs then ms/Ms and fs/Fs. This may reveal the poor demand for dental treatment for both primary and permanent dentition and even treatment was present it was directed for extraction rather than preserving permanent teeth. These results were in agreement with Baram in 2007[21] and Al-Galebi in 201 [5].

There were significantly higher ms in rural area than urban area while fs/Fs were in opposite picture. This indicates poor educational level in rural area towards dental health, this agree with Ali in 2001 [22] and Al-Sadam in 2013 [23].

In present study, the result was shown the percentage of dental caries was lower in obese children this agree with Al-Saadi in 2009 [24]. This result could be partially explained that a high amount of fat in the diet binds to various sugars in the diet thus decrease their solubility lead to drop in pH value and weaker acid attacks, and a fatty protective layer over plaque would prevent fermentable sugar substrate from being reduced to acid[25].

Conclusion

This study revealed that a higher prevalence of dental caries experience was recorded, in children of urban than children of rural areas. Therefore, there is need for an improving public and school preventive programs, and encouraged to orient health knowledge in a positive direction.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

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