

Effect of Dietary and Feeding Habits on Caries Prevalence in a Sample of Preschool Children in Jeddah Saudi Arabia

Abeer Al-Nowaiser*

Associate Professor of Pediatric Dentistry, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia

***Corresponding Author:** Abeer Al-Nowaiser, Associate Professor of Pediatric Dentistry, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia.

Received: February 07, 2017; **Published:** March 17, 2017

Abstract

Introduction: Dental caries is an infectious, dependent on diet considered one of the high prevalent diseases of the oral cavity. In preschool children, it is called Early Childhood Caries (ECC), but also commonly known as “baby bottle tooth decay”. Dietary habits of preschool children is of most importance, because it’s the foundation for life time health, strength and intellectual vitality is lead out during that period It is well known that certain feeding practices, such as bedtime bottle feeding, “at will” breast feeding, and frequent intake of sugary snacks and drinks, contribute to the development of ECC

Objectives: The aim of the present study was to investigate effect of dietary habits on caries prevalence in a sample of school children in Jeddah, Saudi Arabia.

Materials and Methods: A cross-sectional survey carried out on 802 pre-school children aged 2-6 years (mixed dentition), the samples were randomly selected from University Hospital (king Abdulaziz) and different health care centers from Jeddah city, Saudi Arabia.

Questionnaires: A questionnaire including Diet information, oral hygiene, measure, was collected.

Clinical Examination: The teeth were examined using a light source using sterile disposable mirrors and probes. The examination is done using dmft/DMFT index. Clinical examination findings are to be recorded in a WHO simplified data collection charts. After clinical examination, each child will receive a copy of the examination chart indicating the treatment plan for his teeth.

Statistical analysis: The Data obtained from this study was analyzed using One-Way ANOVA t-test.

Results: Breast feeding and bottle feeding combination had the highest values followed by breast feeding and the least was bottle feeding (Table 1).

Children consumed sweets once daily showed the highest numbers followed by uncontrolled intake of sweets and followed by children who consumed sweets twice a day, and then 3 times a day and the least was they do not eat sweets.

Children consumption of diet showed that the highest numbers were for children eating unhealthy diet followed by Fair diet while unhealthy diet consumption showed more scores than healthy diet.

Conclusions: It was concluded that low income, race/ethnicity, poor diet, and other poor eating habits have been identified as risk factors for ECC.

Keywords: Dietary; Preschool Children; ECC

Introduction

Dental caries is an infectious, dependent on diet considered one of the high prevalent diseases of the oral cavity. In preschool children, it is called Early Childhood Caries (ECC), but also commonly known as “baby bottle tooth decay”. The American Academy of Pediatric Dentistry (AAPD) defined ECC as the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces (dmfs) in any primary tooth in preschool age child between birth and 71 months of age [1].

ECC is a highly prevalent and potentially devastating health condition in industrialized countries, affecting nearly 11 percent of two year old children, 21 percent of three years old children, 34 percent of four years old children, over 44 percent of five years old, and disproportionately affecting children in underserved populations (i.e., low socioeconomic and immigrant populations) [2,3]; Dietary habits of preschool children is of most importance, because it’s the foundation for life time health, strength and intellectual vitality is lead out during that period [4,5].

In early childhood, adequate dietary intake is important for growth and development and to prevent nutrient-related deficiencies and toxicities, but excess dietary intake is likely to cause obesity [6]. Prevalence of excessive body weight and obesity among children is increasing in many countries [7]. It is believed that one of the two most important reasons for this increase is insufficient physical activity of children [8].

Developing healthy diet and physical activity patterns early in life is essential so that these practices follow into adulthood, which may prevent obesity, type 2 diabetes, and other chronic diseases [9].

Although ECC is an infectious disease, the role of diet in acquisition of the infection and development of the disease was critical. Children with ECC had frequent and prolonged consumption of sugars from liquids. Caries-promoting sugars such as sucrose, glucose and fructose, contained in fruit juices and many infant formula preparations; even readily metabolized by *Streptococcus mutans* and *Lactobacilli* to organic acids that demineralized enamel and dentin.

It is well known that certain feeding practices, such as bedtime bottle feeding, “at will” breast feeding, and frequent intake of sugary snacks and drinks, contribute to the development of ECC [7].

Failure to eat breakfast daily and eating fewer than 6 servings of fruits or vegetables a day were also associated with dental caries in very young children [10]. Unfavorable eating habits vary among socioeconomic and race-ethnicity groups and may partially explain differences in ECC risk [11].

Established dietary recommendations emphasize the selection of a variety of foods, low intakes of fat, saturated fat, and cholesterol, and moderate use of salt and sodium, primarily to reduce the risks of chronic diseases [12]. Dental diseases, especially caries, are rarely addressed. Dietary advice given for general development and well-being needs to be integrated into oral health counseling. Several instruments have been developed to assess the overall quality of the diet. The Healthy Eating Index (HEI) is one index of overall diet quality based on the food pyramid. The HEI is used to assess adequacy, moderation, and diversity of food choices [13]. Modifications to the HEI score as well as isolation of specific components of the HEI to assess intake and nutrition status of special groups have previously been reported [14]. The association of dentition status to nutritional status using the HEI has been explored in older adults [15], but it is not known if the HEI is an indicator of a low-caries-risk diet in young children.

Aim of the study

The aim of the present study was to investigate effect of dietary habits on caries prevalence in a sample of school children in Jeddah, Saudi Arabia.

Materials and Methods

A cross-sectional survey carried out on 805 pre-school children aged 4-6 years (mixed dentition), children were randomly selected from King Abdulaziz University Hospital and multiple health care centers form Jeddah city, Saudi Arabia.

Methods of data collection

Questionnaires

A structured questionnaire to evaluate socio-demographic information, oral hygiene, habits, water consumption and diet information was performed.

Clinical Examination

The teeth were clinically examined using a flash light with the child facing a window, using sterile disposable mirrors and blunt probes, according to the WHO class III classifications.

The examination charts were done using dmft/DMFT index. Caries was diagnosed when there was:

- a- Cavity or white spot apparent on visual or tactile inspection.
- b- Tooth with history of extraction due to pain & presence of cavity prior to extraction
- c- Presence of dental restoration.

Teeth missing because of trauma, congenital absence or normal shedding was not included in the DMFS index clinical examination findings were recorded in a WHO simplified data collection charts. After clinical examination; all children received a copy of the examination chart indicating the treatment plan for their teeth.

Statistical Analysis

Data obtained from this study were collected, tabulated and statically analyzed using One-Way ANOVA t-test. The level of significance was used

Results

Breast feeding and bottle feeding combination had the highest values followed by breast feeding and the least was bottle feeding (Table 1).

Feeding		Counts	%	
Type	Breast Feeding	182	22.3	
	Bottle Feeding	164	16.0	
	Both	459	59.7	
	Total	805	100.0	
Period	Min	Max	Mean	SD
	0.0	5.0	1.70	0.65

Children consumed sweets once daily showed the highest numbers followed by uncontrolled intake of sweets and followed by children who consumed sweets twice a day, and then 3 times a day and the least was they do not eat sweets (Table 2).

Diet		Counts	%
Sweets consumed daily	Don't Eat	42	7.0
	Once	189	31.4
	Twice	150	24.9
	3 times or More	61	10.1
	Uncontrolled	160	26.6
	Total	805	100.0
Favorite times for eating candy	After Meals	64	10.8
	Between Meals	221	37.3
	After Dinner	16	2.7
	Not Specific	292	49.2
	Total	805	100.0

Children consumption of diet showed that the highest numbers were for children eating unhealthy diet followed by Fair diet while unhealthy diet consumption showed more scores than healthy diet (Table 3,4).

Diet Index	Counts	%
Very Unhealthy Diet	132	16.3
Unhealthy Diet	346	42.9
Fair Diet	223	27.7
Healthy Diet	104	12.9
Total	805	100.0

Variables		N	DMF			DMFS		
			Mean	SD	P-value	Mean	SD	P-value
Type of Milk consumption	Breast Feeding	212	3.51	3.982	0.195	8.04	11.512	0.058
	Bottle Feeding	204	2.83	3.554		5.60	8.030	
	Both	369	3.51	3.623		8.29	11.237	
Period of Feeding	< 1 yr.	48	2.61	3.313	0.679	5.10	8.882	0.463
	1 - < 2 yrs.	334	3.44	3.667		7.88	10.896	
	2 - 3 yrs.	355	3.41	3.850		8.08	11.370	
	>3 - 5 yrs.	68	3.60	3.274		6.57	6.340	
Times of sweets consumed daily	Don't Eat	93	2.29	2.932	<0.001*	4.00	5.094	<0.001*
	Once	239	2.74	3.454		5.90	9.268	
	Twice	186	3.19	3.578		6.75	8.924	
	3 times or More	94	4.57	3.649		12.03	14.063	
	Uncontrolled	213	4.09	4.088		9.94	12.692	
Favorite times for children to eat candy	After Meals	86	2.47	3.112	0.001*	5.17	7.212	<0.001*
	Between Meals	294	3.25	3.621		6.53	8.506	
	After Dinner	23	1.00	2.160		2.00	4.195	
	Not Specific	402	3.85	3.897		9.57	12.811	
Diet Index	Very Unhealthy Diet	137	4.23	3.696	0.001*	9.56	9.726	0.009*
	Unhealthy Diet	414	2.88	3.311		6.54	9.382	
	Fair Diet	218	3.22	3.876		6.37	9.397	
	Healthy Diet	36	1.56	2.501		3.56	6.191	

*significant using t-test @ 0.05 level

*significant using One-Way ANOVA or t-test @ 0.05 level

Discussion

The present study compared the association between dental caries prevalence and dietary habits in a sample of preschool children.

When comparing, breast feeding with bottle feeding or if the child is consuming both of them together there was no statistical significance difference regarding caries prevalence in selected research groups.

Breast feeding is the most commonly accepted practice in the western world. On the other hand, mixed feeding breast and bottle feeding is considered the most common type of feeding in Saudi Arabia [12,13].

This is supported by the work of Rosenblatt and Zarzar [14], Rodrigues and Sheiham [15] who stated that the duration of bottle use is not significantly related to caries prevalence, but bottle contents is the important factor, such as milk with sugar or honey, sweetened juices, increased the risk of caries.

In another study by Carino., *et al.* [16] no statistically significant relation was noted between caries and bottle-feeding and weaning at more than age 2 years. Tinanoff., *et al.* [17] stated that sleeping with baby bottle milk or other sugary drinks does not always cause caries since the basic reasons for tooth demineralization in very small children include both, frequent exposure to a cariogenic diet and early infection with cariogenic bacteria.

Also, the period of feeding had no significant difference association with increased caries prevalence in this study; this is supported by the work of Carino., *et al* [16].

The dental literature revealed a strong statistical association between cariogenic diet and caries prevalence in children. The relation between the number of sugary meals and caries was statistically significant. Dental caries was more prevalent among the children who had more than two sugary meals per day, dental caries increases with age and with the association between a cariogenic diet and the frequency of sugary food intake. This is supported by the work of Rodrigues and Sheiham [15] who found higher caries incidence associated with high daily frequency and weight of sugar intake.

Another study by Kiwanuka., *et al.* [18] showed no relationship between the frequency of sugar intake and dental caries. They reported that the availability and low price of sugar, subsequently this increases its consumption rate.

There was a strong statically significant association between how many times the child consumes candy and caries prevalence, caries prevalence is increasing with number of eating times per day and also if its uncontrolled.

Caries was significantly associated with frequency of candy consumption; in addition, eating snacks between meals. Caries risk increased in children who frequently ate sugar more than children who ate less sugar. This was supported by the study done by Mobley [19] who stated that consumption of candies more than once a week, and inadequate oral hygiene measures at the age of 2 years can lead to long-term risk factors for caries development in both primary and permanent teeth.

Diet Index

Scientific evidence suggests that there is a lifelong synergy between nutrition and oral health whereby each one both influences and is influenced by the other; nutrition influences oral health by impacting development and integrity of the oral cavity, and oral health influences nutrition by affecting functional ability to eat [20].

The overall Healthy Eating has limitations with regard to the study of caries. A perfect score of 10 is given when the minimum recom-

mended number of servings in each food group is consumed, but it may also include children with excess consumption, such as excess fruit juice. There is no separate component for sweets as there is in the Food Guide Pyramid, which might result in better discrimination between healthy children and those with ECC. Even with these limitations, the results of this analysis indicate there is a significant relationship between adherence to general healthy eating guidelines and a reduced likelihood of S- ECC in young children. Strength of the Healthy Eating Index is that it is derived from a 24-hour food recall, so an accurate “snapshot” of the child’s diet and how well it conforms to the food pyramid is obtained.

Healthy Eating Index is a predictor of the prevalence of S-ECC, independent of race/ethnicity and socio-economic status. These findings highlight the value of providing a consistent message about diet to the public, and may suggest other strategies to prevent ECC in vulnerable segments of the population.

Favorite times for children to eat candy has a very important relation to caries prevalence, as it shows from the results that there is statistically significant increase of caries index if snacks are taken between meals compared to low caries if taken after immediately after meals.

Eating Snacks habits is common among children, and the preferred foods usually are candies or sugary snack type foods that were found to be significantly associated with caries development. Children who consumed sweets had higher caries prevalence than children who did not consume sweets [21,22]. Also, caries was significantly associated with frequency of sugar consumption; flavored milk and soda drinks, in addition to eating snacks between meals. Caries risks increased in children who frequently consumed sugar, more than children who rarely does.

Rodrigues and Sheiham [15] found higher caries increment related to higher daily frequency and weight of sugar intake.

Moreover, the association of snacking on sugar containing foods and the high levels of dental caries was supported by Jamieson., *et al.* [23], who found that children consuming sugary food had higher mean dmfs than those who consumed non-sugar snacks.

Conclusions

It was concluded that low income, race/ethnicity, poor diet, and other poor eating habits have been identified as risk factors for ECC.

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Volume 8 Issue 5 March 2017

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