

Association of Prevalance and Severity of Dental Caries with Consumption of Food and Beverage Across Age and Gender among 6-12 Years Old Children in Chennai, Tamilnadu

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Abstract

Objective: To investigate the prevalence and severity of dental caries with correlation of food and drink consumption across age and gender in children aged 6-12 years in Chennai.

Materials and Method: Among different schools in Chennai, schools in Ramapuram were selected and the students were selected by multistage random sampling. The pre-validated questionnaire was used, which comprises of open ended questions about diet, brushing technique along with their demographic details. Then the clinical examination was carried out to know about the caries prevalence and severity. A statistical analysis was done.

Results: Snack food was consumed by large amount of children. 60 percentage of children consumed large amount of carbonated drink than fresh juices. Low privileged population consumed large amount of sugar in their tea or milk. When considering all variables, intake of confectionery was solitarly related with dental caries prevalence and consumption of tea with sugar was solitarly related with caries severity.

Conclusion: Large amount of snacks and carbonated drinks were consumed by majority of children and resulted in dental caries.

Keywords: Children, dental caries, prevalence, food.

Introduction

"A clean tooth will not decay."

—Uttered by Leon Williams

Always a dynamic relationship exist between oral health and sugar intake. Diet plays a significant role as factors responsible for maintaining the integrity of teeth by its effect on quantity, PH and composition of saliva and plaque PH.¹ Considering the diseases of an oral

cavity, dental caries is the foremost thing in mind. The increased prevalence of dental caries is mainly due to lack of awareness hence the disease can be eradicated by means of implementation of oral health programs and use of fluoride tooth paste. Sugar consumption is considered one of the most important cause for dental caries especially sucrose.²

Dental caries affects all the humans irrespective of age and gender with worldwide distribution. Dental caries is a multifactorial complex disease, remains the chronic disease of childhood. The most common bacteria, the mutant's streptococci, in particular streptococcus mutants are considered to be most significant bacteria in the initiation of demineralization process leads to dental caries. Diet act as a local factor on oral health, mainly for maintaining integrity of teeth that is by means of PH and composition of saliva and plaque.² Dental caries

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can be termed as a microbiological process that leads to dissolution and destruction of organic and inorganic matrix. Prevalence of dental caries is of high concern.

According to Federation Dentaire International, nutrition is defined as the sum of the process by which an individual takes in and utilizes food. This study investigated the significant association caries experience with food and drink consumption among children.³ Sugar can be termed as easily fermentable carbohydrate. Sucrose, glucose and fructose. The average daily intake was estimated at 5 times the intake of school days and 2 times the intake at weekends divided by 7.

Acid products, formed by bacterial fermentation of dietary carbohydrate in the ental plaque are the requirement for the initiation of dental caries.⁴ Host tissue interactions with various risk factors such as carcinogenic bacteria, saliva, fermentable carbohydrate and absence of fluoride in the oral environment, influence of bacterial colonization as well as either the determination or demineralization of tooth surface.⁵

Considering fruit juices particularly, sweetened with artificial sugars and soft drinks contain significant amount of added sugar can cause demineralization of enamel and their improper feeding in infant leads to early childhood caries.⁶ Caries is mostly seen in young children due to various reasons. One of the most common causes for the increase scale of dental caries is the diet especially that diet may cause caries when there is too little fluoride.⁷

While considering early experiments it had been shown the co-relationship between prevalence of dental caries and sugar consumption is not clear in few older experiments were as within last few decades fewer reports have shown significant associations between differing measures in intake of sugar with occurrence of dental caries.^{8,9} The majority of intake of sugar was hidden in carbonated drinks and processed food. Contribution for total sugar intake in children and adults is mainly by sweetened added sugars. Consequently, carbonated soft drinks will likely to be continued to be trending worldwide and this trend may have a detrimental effect on the dental health because sugared soft drinks are potentially carcinogenic. Females are much more prone to dental caries than male.¹⁰

The evidence and prevalence of dental caries is rising in low income countries because of availability and frequent consumption of sugary foods and drinks.¹¹

According to Shen et al those children aged from 6years living in non-fluoridated and fluoridated communities denotes few improvements in prevalence of dental caries that has taken place over decades.¹² The aim of this study is to study the correlation of prevalence and severity of dental caries with food and beverage intake.

Materials and Method

A clinical examination was done in children aged 6-12 years in different schools of Chennai using multistage sampling method. Out of different blocks in Chennai, Ramapuram block was selected by lottery method. 8 different schools were there out of which 4 schools were selected by random sampling method. Prior permission was taken from the principals of the schools. Ethical approval was obtained by the ethical committee of department of public health dentistry, SRM dental college. The total number of students in every school neared 500. The schools were independent and not state funded. The questionnaire was extracted from the study done by Sayegh et al in the year 2002⁽¹³⁾. In both the languages questionnaire was prepared for the convenience of the parents and children. The questionnaire consisted a variety of questions that included food consumed during breakfast, lunch, dinner, snacks, drinks, method and technique of brushing etc. It also included questions such as information on children's date of birth, gender, children's current or past medical history. A pre sampling was done among 30 children's. The parents of school children had completed questionnaires was utilized for obtaining information about dietary habits. A clinical examination was conducted to obtain information about the prevalence as well as severity of dental caries. With parents' consent, an oral examination is done for every child. Data were obtained by means of direct data entry program. The samples were separated according to the gender and age. The oral health examination comprises of an identification of decayed, missed or filled tooth. The clinical examination was carried out by using plane mouth mirror and periodontal probe. The ethical approval was obtained from ethical committee of Public Health Dentistry, SRM Dental College.

Caries was recorded according to the DMFT index (Henry T. Klein, Carole E. Palmer and Knutson J.W., 1938). D indicates decayed, M indicates missing tooth and F indicates filled tooth. A tooth was considered as decayed only if there was visible evidence of cavitation including untreated caries and filled teeth with secondary caries as per DMF criteria for decayed tooth. The missing

tooth was indicated when the teeth missing is believed to be lost due to caries and no successor was observed and filled when the cavity is filled with restorative material. Clinical examination was done and prevalence of caries and severity was recorded.

Data Analysis: All data were analyzed and recorded. Chi-square test had been used to determine the relationship between various types of food/drink intake

with caries prevalence and severity. SPSS version 13.5 was used for the analysis of the data.

Results

The results were mainly related to dental examination and information from parents by means of the completed questionnaires which included clinical findings of 346 boys and 156 girls.

Table 1: Relation between food consumed during morning

		What does your child have for Breakfast?					
		IDLI/DOSA/BREAD		Milk		Others	
		N	n %	n	n %	n	n %
Gender							
Male		136	50.4%	87	61.7%	58	65.2%
Female		134	49.6%	54	38.3%	31	34.8%
Age							
5				1	.7%	3	3.4%
6		27	10.0%	26	18.4%	10	11.2%
7		79	29.3%	51	36.2%	15	16.9%
8		59	21.9%	25	17.7%	16	18.0%
9		52	19.3%	18	12.8%	25	28.1%
10		33	12.2%	10	7.1%	8	9.0%
11		14	5.2%	9	6.4%	9	10.1%
12		6	2.2%	1	.7%	3	3.4%
What is the caries severity?	dmf>4	91	33.7%	58	41.1%	35	39.3%
	dmf≤4	179	66.3%	83	58.9%	54	60.7%
What is the caries prevalence?	Caries free	180	66.7%	71	50.4%	48	53.9%
	Caries	90	33.3%	70	49.6%	41	46.1%

Table 1 shows the relationship between foods consumed during morning denotes the proportion and number of children in relation to type of food consumed

during breakfast. The children having milk is food to have more caries due to large consumption of sugar.

Table 2: Relation between food consumed during lunch

		What does your kid have for Lunch?					
		Chapatti		Rice		Others	
		N	n%	N	n%	n	n%
Gender							
Male		73	64.0%	168	52.5%	40	60.6%
Female		41	36.0%	152	47.5%	26	39.4%

		What does your kid have for Lunch?					
		Chapatti		Rice		Others	
		N	n%	N	n%	n	n%
Age							
5		2	1.8%			2	3.0%
6		11	9.6%	37	11.6%	15	22.7%
7		39	34.2%	91	28.4%	15	22.7%
8		15	13.2%	72	22.5%	13	19.7%
9		20	17.5%	65	20.3%	10	15.2%
10		14	12.3%	29	9.1%	8	12.1%
11		8	7.0%	21	6.6%	3	4.5%
12		5	4.4%	5	1.6%		
What is the caries severity?	dmf>4	43	37.7%	118	36.9%	23	34.8%
	dmf≤4	71	62.3%	202	63.1%	43	65.2%
What is the caries prevalence?	Caries free	59	51.8%	198	61.9%	42	63.6%
	Caries	55	48.2%	122	38.1%	24	36.4%

Table 2 shows the relation between food consumed during lunch shows the relationship between different foods consumed during lunch. The children having rice is found to have caries than other children. Caries prevalence is much more in males as consumed to females.

Table 3: Relation between food consumed during snacks.

		What does your kid have for Snacks?					
		Biscuits		Chips/Snacks		Others	
		N	n%	N	n%	n	n %
Gender							
Male		115	52.8%	130	60.7%	36	52.9%
Female		103	47.2%	84	39.3%	32	47.1%
Age							
5		1	.5%	2	.9%	1	1.5%
6		28	12.8%	29	13.6%	6	8.8%
7		70	32.1%	50	23.4%	25	36.8%
8		42	19.3%	45	21.0%	13	19.1%
9		39	17.9%	45	21.0%	11	16.2%
10		22	10.1%	21	9.8%	8	11.8%
11		13	6.0%	16	7.5%	3	4.4%
12		3	1.4%	6	2.8%	1	1.5%
What is the caries severity?	dmf>4	80	36.7%	78	36.4%	26	38.2%
	dmf≤4	138	63.3%	136	63.6%	42	61.8%
What is the caries prevalence?	Caries free	51	41.3%	66	33.5%	22	11.0%
	Caries	127	87.7%	138	88.5%	55	70.0%

Table 3 shows that the children consuming large amount of snacks is found to have more caries than other children.

Table 4: Relation between food consumed during dinner.

		What does your kid have for Dinner?					
		Tiffin		Rice		Others	
		N	n %	N	n %	n	n%
Gender							
Male		130	57.3%	98	50.5%	53	67.1%
Female		97	42.7%	96	49.5%	26	32.9%
Age							
5				2	1.0%	2	2.5%
6		33	14.5%	17	8.8%	13	16.5%
7		63	27.8%	61	31.4%	21	26.6%
8		39	17.2%	46	23.7%	15	19.0%
9		44	19.4%	38	19.6%	13	16.5%
10		22	9.7%	21	10.8%	8	10.1%
11		19	8.4%	7	3.6%	6	7.6%
12		7	3.1%	2	1.0%	1	1.3%
What is the caries severity?	dmf>4	84	37.0%	68	35.1%	32	40.5%
	dmf≤4	143	63.0%	126	64.9%	47	59.5%
What is the caries prevalence?	Caries free	145	63.9%	107	55.2%	47	59.5%
	Caries	82	36.1%	87	44.8%	32	40.5%

Table 4 states that the children having Tiffin which consists of large amount of starch are found to have high risk of caries.

The results indicated that 59 percentage consumed idly/dosa/bread for their breakfast, 73 percentages have chapatti for their lunch, 60 percentages have chips for their snacks, and 67 percentages have other items for dinner. Majority of kids have coca cola/Pepsi as drinks. Considering the prevalence of dental caries in children, significantly the risk had associated with confectionary and had sweets and carbonated drinks ($p<0.05$). When considering the severity of dental caries, the risk was significantly associated with beverage(tea) consumption (p value <0.05). The prevalence and severity of caries in respect to snack food consumption was found high. Carbonated drinks were consumed more than fresh juice; few children report to have fresh juice than carbonated drink. Less privileged children have tea with sugar in large amount.

Discussion

In children, dental caries (tooth decay) is considered as the main oral disease. Although dental caries is

preventable it still affects many children, mainly those who are in a disadvantaged social background. When sucrose is added to milk, it renders milk carcinogenic.¹⁴ The review of relationship between sugar consumption and dental caries was studied by Woodward and Walker who collected data for every country was obtained from the F.O. light company, sugar consumption was estimated, a positive but less significant association was seen between the average sugar consumption and DMF scores.¹⁵

In 1987, 1988 and 1989, a survey was performed yearly dietary studies in combination with registration of dental caries in children aged 6 to 12 years. It was found that this group of children had more questionable diet. Most of the sugar taken by humans is found mainly in carbonated drinks and processed foods.¹⁶

The biway relationship between sugar consumption and dental caries is influenced by many facts about sugar consumption like total amount, frequency of consumption, the varying sugar content of foods, physical form of sugar containing foods etc.¹⁷ Another study in Australia proves that sugar sweet beverages

intake by Australian children is higher when compared to India.¹⁸

Dental caries is a complex disease, the cause of which has received significant attention during the nineteenth and most of twentieth century. According Global epidemiology study South Asia is found to have higher caries rate accounts for upto 90%in children aged 12 years.¹¹

Sugar sweetened beverages are one of the most important source of refined carbohydrate in developed nation such as United States and Australia.¹⁹ A controversial issue, regarding bovine milk and its cariogenic potential in human is still under review but the animal studies found non-cariogenic potential to bovine milk however the question regarding humans is still an controversy.²⁰ Previous investigation shows that in children extreme conditions like protein malnutrition and severe starvation increased the carcinogenic potential of fermentable carbohydrates.²¹ Brushing with fluoridated tooth paste is the simplest and considered as effective way to prevent tooth decay. Added, lack of knowledge about the appropriate dietary habits in children may add unfavorable relationship with oral health.

The analysis represents the prevalence and severity of dental caries in relation to snack food consumption. It was shown that many children from low privileged to have cakes, biscuits confectionaries, and snack food were low it may play a positive role in oral health.

The children whose caries severity is found to have d m f greater than 4 drank more liquids with sugar. A worldwide change in the diet and lifestyle practices had occurred before the few decades notably increase of consumption of sugary and fatty foods. Higher carbonated soft drink consumption increases the number of dental caries in primary teeth compared to other fluid but almost more than 50 percent of children were frequently consuming carbonated drinks.²² Children consuming large amount of food and carbonated drinks were shown in the table. Breakfast along with drinks did not change with age and gender. Regardless of one's socio-economic status, in urban parts of developing nation compared with rural group consumption of sugar added foods and drinks were frequently taken urban area. From the findings in relation to the breakfast and dinner were similar. 60 percentage children had sweet items during dinner and 40 percentage cooked vegetables. 60 percentage of children had milk or tea with sugar in

large amount. In this present study it was ended with that children with high caries prevalence had poor dietary habits compared those children were caries free. Study of types of consumption, food habits, nutritive value of diet have been analyzed. Snack food items were consumed in large amount by children. Because of worldwide change in diet has been noticed in recent years stated that consumption of large amount of food and drinks had shown the prevalence of caries.

The study findings found that moderate to high level of caries experience is noted in children who have carbonated drinks, drink (milk) with added sugar and refined carbohydrates.

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