

# Food Sweetening as a Risk Factor For Early Childhood Caries

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## Abstract

Practice of sweetening regular food to enhance feeding in children has been anecdotally reported by parents. Practices include adding sugars, jams to staple foods such as chapati, roti and even rice. Since added sugars plays a major role in the etiology of Early Childhood Caries, the risk posed by such practices was investigated. In a cross sectional study, prevalence of ECC was checked with dmfs index while practice of food sweetening was part of the questionnaire Children Eating Behaviour Questionnaire for Early childhood Caries answered by parents with informed consent in four different centres of Bangalore, Dharwad, Raichur and Mangaluru. Prevalence of caries was 48.5% in the total sample. Nearly 50% of the sample reported practices of sweetening the food. Odd ratio revealed that children consuming sweetened food were 1.164 times more at risk for developing ECC. Hence the pediatric dentist should be aware of such practices and actively counsel the parent towards reduction of added sugars in the diet.

**Keywords** Early Childhood Caries, Eating Behavior, Food Sweetening

## INTRODUCTION

Early Childhood Caries (ECC) is a significant oral health problem among Indian Pediatric population with prevalence rates ranging from 27.5% to 54%<sup>1-3</sup>. Nearly 106 factors have been identified as a risk factor for ECC with contributory 29 dietary factors. ECC can lead to poor nutrition, esthetics and resultant chronic dental pain can be debilitating to the child. Hence it is essential to identify potential dietary factors that can be counselled for changes to promote oral health.

Food preferences throughout infancy and childhood play an important role in the nutrition of the children. IAP recommends exclusive breast feeding as the source of nutrition for newborn up to 6 months of age, wherein complementary food such as energy rich homemade foods are given<sup>4</sup>. Complementary food predominantly introduced in India include fruits, mashed vegetables, home prepared pulses and lentils with millets and dry fruit mixtures. In order to increase the palatability, flavor and texture, sugar, jaggery or

date syrup is mixed with the complementary food as sweet and salt flavor is the most preferred flavors in comparison to sour or bitter<sup>5</sup>. Sugar or sweet flavor can be addictive and in fact has been recognized to be as addictive as tobacco<sup>6</sup>.

On examining several children with severe ECC, the author came across anecdotal evidence of parents sweetening the food of 2-5 year old in order to ensure the child is eating well. Such deleterious feeding practices could pose as a risk factor for Early Childhood Caries. Hence the present study was undertaken as part of the doctoral thesis to check the risk posed by such practices on ECC.

## METHODOLOGY

In a cross sectional study of 846 children from private playschools of 4 cities of Bengaluru, Raichur, Dharwad and Mangalore, children were examined by pediatric dentist in a type 3 ADA examination using sterile and disposable ice-cream sticks while the parent completed a validated questionnaire Children's eating

Behaviour Questionnaire for Early Childhood Caries (CEBQECC)<sup>7</sup>. Sample size was determined on the prevalence of ECC obtained through a pilot study with 5%  $\alpha$  error (95 % confidence interval) and 20%  $\beta$  error (80% power). Data was collected in a school based setting. Approval was obtained from Ethics committee of Nitte University for the doctoral thesis. Permission from the school authorities was obtained while parental informed consent was obtained for the questionnaire.

CEBQECC is an 18 item questionnaire developed by the authors based on CEBQ<sup>8</sup>. CEBQECC has 6 domains including a domain of Food Preference

in which item no 9 was the question “My child’s food needs to be flavored with sugar/sweetness for him to eat.” Parent were asked to respond on a Likert scale of 0 = Never, 1 = rarely, 2 = sometimes, 3 = often to 4 = always. Finally the results obtained was dichotomized with never, rarely and sometimes merged for absent and often and always for present for statistical purposes. Odds ratio was calculated for different centers as well as for the cumulative sample. Prevalence of dental caries was assessed with the help of DMFS index of Gruebel<sup>9</sup> and definition of ECC as proposed by AAPD<sup>10</sup> was employed to classify children with or without ECC.

## RESULTS

Results of the study are tabulated in the following

**Table 1. Gender distribution in different centers**

Gender	Bangalore		Dharwad		Raichur		Mangalore		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	140	45.3	98	54.4	92	52	96	53.3	426	49.8
Female	169	54.7	82	45.6	85	48	84	46.7	420	50.2
Total	309	100.0	180	100.0	177	100.0	180	100.0	846	100.0

**Table 2. Distribution of presence of ECC in the different centers**

ECC Status	Bangalore		Dharwad		Raichur		Mangalore		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
No ECC	237	76.7	68	37.8	77	43.5	53	29.4	427	51.5
ECC	72	<b>23.3</b>	112	<b>62.2</b>	100	<b>56.5</b>	127	<b>70.6</b>	402	48.5
Total	309	100.0	180	100.0	177	100.0	180	100.0	846	100.0

**Table 3. Distribution of response to CEBQECC from total sample**

Item	Never		Rarely		Sometimes		Often		Always		Absent	Present
	No.	%	No.	%	No.	%	No.	%	No.	%		
My child's food needs to be flavored with sugar / sweetness for him to eat.	264	31.8	146	17.6	192	23.2	117	14.1	110	13.3	422	424

**Table 4. Distribution of response to CEBQECC from different centers**

Item	Bangalore		Dharwad		Raichur		Mangalore	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present
My child's food needs to be flavored with sugar / sweetness for him to eat.	155	154	114	63	75	105	78	102

**Table 5. Odds ratio calculated for item 9 with respect to Early Childhood Caries for different centers as compared to main sample**

Item	Bangalore	Dharwad	Raichur	Mangalore	Cumulative
My child's food needs to be flavored with sugar / sweetness for him to eat.	1.008	0.989	<b>1.250</b>	<b>1.224</b>	<b>1.164</b>

## DISCUSSION

Indian diet predominantly varies from region to region with wheat predominant in the north while rice is predominant in the southern part. Cereals forms an integral part of complementary food as well diet during childhood. Indian food is also reputed to be spicy with use of chillies. The flavor of spice is often introduced to the child in a gradual manner with sugar kept in reserve to negate its effect. However the anecdotal evidence from the mothers that child prefers to add sugar or sweetness to daily consumed food was the motivating part of the study. Mothers often reported that children preferred sugar, jams, or tomato ketchup with Indian breads like chapati or roti instead of traditional vegetable curries as accompaniments. Few mothers also reported that children preferred to sweeten even rice that is traditionally eaten with lentil preparations.

Considering the role played by sugar as an etiologic agent for ECC, it was alarming to record such practices.

According to WHO, recommended added sugar intake for children to be 10% of total energy intake based on observational studies regarding dental caries. This was further reduced to 5% based on low evidence ecological based studies that roughly translates to 25gms/day or 6-7 teaspoons of sugar. However food sweetening adds to the quantum of sugar already added to milk and other foods like desserts.

Prevalence of ECC in the total sample was 48.5% and in accordance with studies in the region<sup>1-3</sup>. However across the different centers, there was a skewed distributed with Bangalore reporting with 23.3% while Mangalore had a prevalence of 70.6%. The role played by varied dietary practices across the regions or by eating behavior of children is still debatable. The odds ratio

calculated for the item for the total sample was 1.164 indicating that children are 1.16 times more at risk at developing ECC while indulging in food sweetening practices. Parents in Mangalore also report more on such practices contributing to increased prevalence of ECC.

Practice of food sweetening is prevalent in Karnataka and need to be taken into consideration during diet counselling. Mothers need to be made aware of its deleterious effects. Moreover eating behavior and food sweetening need to be a part of the caries risk assessment models.

## CONCLUSIONS

Prevalence of ECC in the present study needs to be addressed by the pediatric dentist with effective preventive and management strategies. Pediatric Dentist should consider eating behavior and food sweetening practices as potential risk factor for ECC and mandatorily include these aspects into dietary counselling.

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