ORIGINAL RESEARCH

Food Frequency Questionnaire a Tool for Assessment of Parental Knowledge in Severe Early Childhood Caries (S-ECC) and Caries Free Preschool Children

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ABSTRACT

Introduction: ECC is associated with a number of risk factors, which are classified as biological and social risk factors. Nutritional variables, feeding habits and initial colonization of cariogenic micro-organisms are included in biological risk factors. Low parental education, socio-economic status and poor awareness about the dental disease are included in social risk factors. **Aim:** To assess the parental knowledge using Food frequency questionnaire with S-ECC and caries free group in preschool children. **Methods:** The study was done among 140 children aged 2-6 years. They were classified into 2 groups; Group 1: Children with the S-ECC & Group 2: Caries free group. Their mothers were given Gujarati version of a Food Frequency questionnaire which was modified and validated. **Results:** The co-relation of solid sugars, starchy sugars, semisolid sugars with caries were found to be highly significant in the S-ECC group. The statistical analysis was done with unpaired t- and chi-square test. **Conclusion:** Consumption of solid and liquid sugar increased caries in the S-ECC. The consumption of cheese, rice, plain cereal, chass, roti showed low cariogenic potency. The parents were advised and counseled regarding the prevention of S-ECC.

KEYWORDS: Food Frequency Questionnaire, S-ECC, Parental knowledge

INTRODUCTION

ECC is 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 a preschool-age child between birth to 6 years of age.Any sign of smooth-surface caries in children younger than 3 years of age, is indicative of severe early childhood caries (S-ECC). From ages 3 to 5, 1 or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or decayed, missing, or filled score of 4 (age 3), 5 (age 4), or 6 (age 5) surfaces constitutes S-ECC. The role of diet in an acquisition of the infection and development of ECC is critical.[1]

In Asia, there is more prevalence and severity for the disease, the prevalence in three-year old's ranges from 36 to 85%, whereas in India the prevalence of 44% has been reported for caries in 8 to 48- month -olds. Singh S et al reported a caries prevalence of 54.1% in the preschool children of Hubli and Dharwad city. Parents play a essential task in giving offspring the information and encouragement needed for healthy lives.[2]

Despite multiple roles and areas of responsibility within the family, in the child's oral health related lifestyle, the mother remains to play the key role. Mothers play a significant role in taking decisions on matters that affect their children's health. The beliefs and opinions of mothers are valuable considerations in the children's oral health initiatives.[3]

As the choices of foods for preschool children are determined largely by parents, more attention should be compensated to the factor shaping parents' decision. Parenting way, time pressures as well as a educational and socioeconomic background have been found to be important. Abundant epidemiologic evidence show, consumption of high and low quantities of sugar, majorly sucrose, suggests that it is the main dietary factor affecting dental caries progression and prevalence.[4]

Sucrose is the widely used sugar, which was considered the most common in dental caries, as it was the only thing used for bacterial to formed plaque dextrans. The dominance and establishment of the aciduric S. mutans increased with the frequency of eating sucrose and the acidity of plaque.[5]

The common sugars of importance in S- ECC included the monosaccharides like glucose and fructose. The two properties which cause damage to teeth through fruit juices are the low pH and high titrated acidity of some drinks which causes the erosion on the enamel surface. The fermentable carbohydrates in the drinks get

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metabolized by plaque microorganisms which generate organic acids in the formation of dental plaque that causes demineralization, leading to dental caries.[6]

The Food Frequency Questionnaire was designed specifically for dental studies and assessed the cariogenic quality of snacks and the frequency of snacking, which has been reliable and validated. Snacking patterns are a risk factor for early childhood caries. The questionnaire which was originally in the English language consisted of 35 items which required the participants to recall how often, on average, they have consumed given caries-related food items during the past month.[7]

Sucrose, fructose, and glucose found in vitamin C drinks and fruit juices as well as in solids were probably the major sugars associated with infant caries.[8] The aim of the study was to assess the parental knowledge in Gujarati population using Food frequency questionnaire with S-ECC and caries free group in preschool children.

MATERIALS AND METHODS

A cross-sectional study was conduct on parent and child from the OPD of Department of Paedodontics and Preventive Dentistry. The ethical clearance for the study was taken from the institutional ethical committee (SVI EC/ON/Dent SRP/17042) of Sumandeep Vidyapeeth, Vadodara.

A total number of 140 children aged 2-6 years was divided into 2 groups. Group 1 (70): children diagnosed with S-ECC and Group 2 (70): caries free preschool children as per inclusion criteria. The inclusion criteria were children diagnosed with S-ECC according to guideline criteria of AAPD 2016 and children willing to participate in the study with informed consent from parent/caregiver whereas the medically/ physically/ mentally compromised children were excluded from the study. The participant's parents were given a questionnaire regarding Food and Frequency in the Gujarati language.

The questionnaire comprised of demographic details of the child, a frequency of taking cariogenic foods to assess dietary intake in relation to dental caries risk. The semi-structured questionnaire was validated(item content validity =0.83) for internal consistency during a test - retest procedure, carried out in one of the preschools, on a sample of 30 parent and child pairs, at a 7day interval and was found to be satisfactory (a = 0.68). The procedure was explained to the parent, before starting with the clinical examination.

Caries status of the child was recorded using mouth mirror and explorer. After examination, the parent was informed regarding the status of caries for their children. The child requiring any emergency dental procedure was attended. The food frequency questionnaire forms(FFQ) were filled by mothers to obtain the data on the frequency of dietary intake habit of children.

RESULTS

A total of 140 parents filled the FFQ, and the collected data was statistically analyzed with the help of unpaired t-test.

In solid food group (Figure 1), The Donuts or Muffins consumption in caries- free group was 0.5 whereas it was 1.81 in S-ECC group. The consumption of pudding was 0.3 in caries free group where as it was 0.44 in S-ECC. The bread with jam showed a value of a mean difference in caries free group which was 1.13 and 2.31 in S-ECC group. The jam or fruit group showed mean difference in caries free group which was 1.14 and 1.73 in S-ECC group. The sweet jelly showed mean difference in caries free group which was 0.83 and 0.57 in S-ECC group.

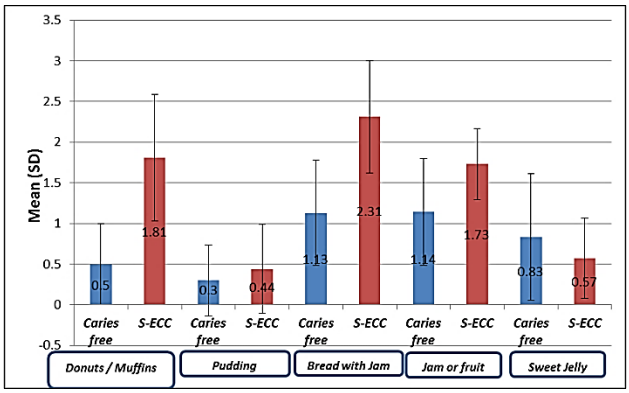

Figure 1: Comparison of the responses to the food frequency questionnaire in terms of {Mean (SD)} among both the groups using unpaired t test for Solid food group.

In solid and starchy food group (Figure 2), the sukhdi showed value of mean difference in caries -free group that was 2.2 where as it was 2.76 in S-ECC group. The bun with jam consumption showed mean difference of 1.89 in caries- free group where as 1.7 in S-ECC group. The popcorn intake by caries- free group was 2.44 whereas 2.57 in S-ECC group. The Chikki eating frequency was 2.4 in caries -free group whereas 2.99 in S-ECC group. The chocolates consumption was 2.87 in caries- free group and 4.94 in S-ECC group.

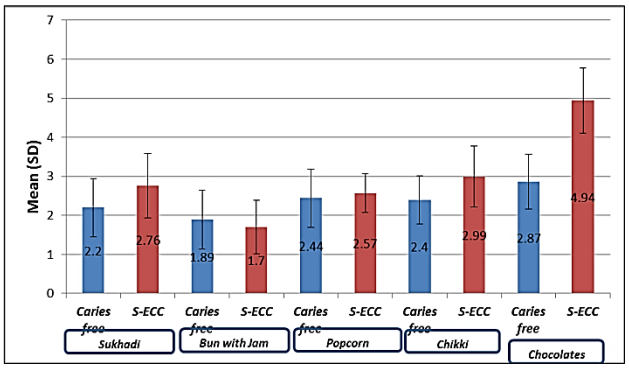

Figure 2: Comparison of the responses to the food frequency questionnaire in terms of {Mean (SD)} among both the groups using unpaired t test for Solid and starchy food group.

In liquid and semisolid sugar food group (Figure 3), the consumption of sticky candy in caries -free group was 0.5 where as it was 1.41 in S-ECC group. In sugar added milk/ coffee showed mean difference in caries- free group as 2.63 where s 3.51 in S-ECC group. The gum (not sugar free) group showed mean difference in caries- free group as 1.67 and 1.77 in S-ECC group. The hard candy consumption in caries- free group was 1.29 and 1.89 in S-ECC group. The sticky and slowly dissolving sugar eating frequency in caries- free group was 1.03 and 1.81 in S-ECC group. The frequency of soda drinking in caries- free group was 1.53 where as 3.01 in S-ECC group. The cold drink beverage frequency in caries -free group was 2.04 whereas it was 2.86 in S-ECC group.

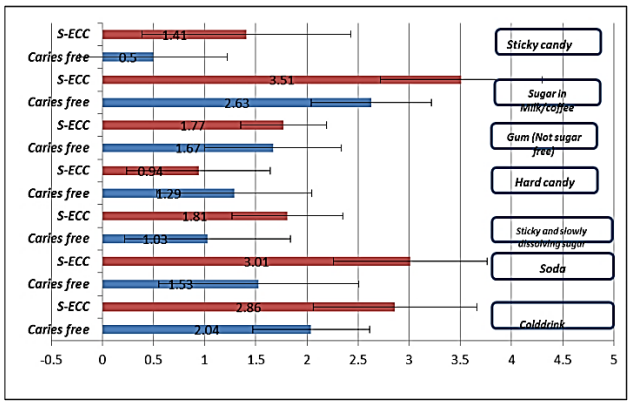

Figure 3: Comparison of the responses to the food frequency questionnaire in terms of {Mean (SD)} among both the groups using unpaired t test for Liquid & semisolid food group

DISCUSSION

Parental knowledge regarding dental caries is of prime importance to prevent caries in their children. Parents are prominent role model for healthy eating. Diet is essential in the strength and growth of children. The major importance in the etiology of dental caries at any age, and more specifically, in preschool children were considered as feeding habits. The habits present since early life are likely to continue into adulthood hence healthy eating habits should be established and maintained. Therefore it is very main reason to understand influences on children's diet.[9]

This study provides preliminary evidence of cross-cultural validity and reliability of the Gujarati language version of the Food Frequency Questionnaire specifically created for studies of dental caries. Factor analysis suggested four subscales: solid sugar, solid and starchy sugar, liquid and semisolid sugar, slowly dissolving and sticky sugar, having a similar relationship to an established classification of sugary foods by extent of oral retention. A standardized procedure of translation of the questionnaire from English to the Gujarati language was done by a person well versed in both the languages. Shinga Ishihara et al. in 2014 used the Food Frequency Questionnaire which was available in Japanese.[8]

The dental literature uncovered a major statistical association between children who had caries and taking the cariogenic diet. McCollum and coworker in 1920 programmed feeding machines which demonstrated that rats when exposed to a high sugar diet, experienced caries according to the number of times per day.[10] The major carbohydrate responsible for the development of dental caries was emphasized as sucrose. Moreover, the correlation of snacking on sugar -containing foods and the high levels of dental caries was up held by Jamieson et al. in 2004.[11] The correlation between the number of sugary meals and caries was statistically significant.

The prevalence of dental caries was more along with children who had more than four sugary meals every day including the main meal, rather than in those who had fewer than four meals. The association between a cariogenic diet and the frequency of sugary food intake increases with age in early childhood caries.[12]

Products that are retained and sticky for long periods in the mouth or consumed with more frequency had a higher cariogenecity than the foods that are quickly eliminated from the oral cavity. Kashket et al[13] found Doughnuts and caramels, and jelly beans processed at the highest temperature gave rise to the highest amount of the sugars compared with the other test foods. and study on the longer that foods are retained in the oral cavity, the starch has to break in the sugars and lead to the caries development. Figure 1, showed a highly significant difference with donuts, bread with jam and jam and fruit group in S-ECC group and low significant difference with pudding and sweet jelly in both the groups.

The major dietary factor affecting dental caries prevalence and progression according to the epidemiologic evidence which was obtained from the groups that consumed high and low quantities of sugar was sucrose The total cariogenecity also determined by the form of the food product; that is, the its consistency of the sugar-containing foods that affects their retention time in the mouth. Distinctions can be made between liquids that are cleared rapidly and adhesive (sticky) foods that vary widely in retentiveness.[14] Figure 2 showed a highly significant difference with sticky candy, chocolates, sukhdi and chiki in the S-ECC group and low significant difference with a bun with jam and popcorn in both the groups.

Smith AJ et al.[15] stated that Children who drink flavored milk and soda drinks had the high risk of caries (OR = 10.71 soda drinks, OR = 4.50 flavored milk) than other children. Lactose is found in milk and does not get fermented to the same degree as other sugars. Moreover, it may be less cariogenic because the phosphor proteins in milk may inhibit enamel dissolution, and the antibacterial factors in milk may get involved with the oral microbial flora have the major cariogenic potential of fruit-flavored drinks and fruit juices is due to the high sugar content. They are consumed frequently by children because of their low cost, high acceptance and the belief of parents that they are nutritious. In presents study milk showing

Slowly dissolving and sticky sugar group	Group	N	Mean	Std. Deviation	t value	P value
Cheese	**Caries free**	70	2.17	0.76	0.102	0.919
	S-ECC	70	2.19	0.88		
Plain Yoghurt	**Caries free**	70	2.89	0.77	1.325	0.187
	S-ECC	70	3.04	0.62		
Sugar Yoghurt	**Caries free**	70	1.83	0.61	**14.992**	**<0.001****
	S-ECC	70	3.61	0.78		
Roti	**Caries free**	70	3.47	0.77	**3.852**	**<0.001****
	S-ECC	70	3.97	0.76		
Rice	**Caries free**	70	3.27	0.99	1.226	0.222
	S-ECC	70	3.07	0.93		
Plain Cereal cornflakes	**Caries free**	70	1.91	0.89	**4.852**	**<0.001****
	S-ECC	70	1.20	0.84		
Sugared Cereal (chocos)	**Caries free**	70	1.59	0.49	**2.925**	**0.004***
	S-ECC	70	1.96	0.93		
Canned Fruits	**Caries free**	70	0.24	0.43	0.354	0.724
	S-ECC	70	0.22	0.41		
Chass	**Caries free**	70	2.66	1.07	**10.525**	**<0.001****
	S-ECC	70	4.27	0.70		
Dry Fruit	**Caries free**	70	2.74	0.98	**6.856**	**<0.001****
	S-ECC	70	3.74	0.71		
Banana	**Caries free**	70	2.37	0.85	**6.274**	**<0.001****
	S-ECC	70	3.37	1.02		
Milk	**Caries free**	70	2.90	0.72	**11.781**	**<0.001****
	S-ECC	70	4.56	0.92		
Fruit Juice	**Caries free**	70	2.70	0.78	**11.443**	**<0.001****
	S-ECC	70	4.37	0.93		
Cocoa	**Caries free**	70	2.10	0.80	1.677	0.096
	S-ECC	70	1.84	1.00		
Sugar Added Cereal	**Caries free**	70	0.73	0.65	**7.504**	**<0.001****
	S-ECC	70	1.83	1.03		
Jam, Jelly or Syrup	**Caries free**	70	.27	0.44	**7.287**	**<0.001****
	S-ECC	70	1.31	1.11		
Cookie	**Caries free**	70	1.03	0.72	**4.863**	**<0.001****
	S-ECC	70	0.47	0.63		
Cake or Pies	**Caries free**	70	1.84	0.73	**4.496**	**<0.001****
	S-ECC	70	2.49	0.94		
Chips	**Caries free**	70	2.17	0.90	**6.912**	**<0.001****
	S-ECC	70	3.33	1.07		
Cough Drops	**Caries free**	70	0.29	0.45	**2.656**	**0.009***
	S-ECC	70	0.51	0.55		

Table 1: Comparison of the responses to the food frequency questionnaire in terms of {Mean (SD)} among both the groups using unpaired t test for slowly dissolving and sticky sugar(other).

significant association with high risk of caries.

Grobler SR[16] also stated that the combined effects of regular soda pop and other sugary beverage consumption, the greater number of eating occasions and starch consumption increased the risk for dental caries. Marshall et al.[17] examined 642 children in Iowa USA, where they performed a 3- day diet analysis across a span of 5 years. The caries -prone children had a higher intake of soda pop drinks at an interval of 2,3,4 and 5-years. Higher intake of soda drinks had an association with significantly increased odds of caries experience. In the study soda shown significant association with the increase high caries risk in preschool children.

Sohn et al[18] found an extreme significant association of soft drinks with increased caries risk of primary dentition after examining 5985 children in the USA. In the present study Fruit juice, chips, cookie, cakes, soda group were associated with high risk of caries in preschool children. In this study, Figure 3 showed that sugar in milk, soda , and cold drink had a highly significant difference with S-ECC children group, a low significant difference with gum and hard candy in S-ECC groups.

Rodrigues and Sheiham et al.[19] in 2000 found a higher caries incidence related to a higher daily frequency of sugar intake, which again coincides with this study. Sugar present in the human diet upholds bacterial acid production and the colonization of teeth by S mutans. In the Table 1 jam, jelly, sugar added cereal, sugar in yogurts, sugar in milk, sticky and slowly dissolving sugar associated with high caries risk in children.

Hasnain et al. [20] in 2013 stated that majority of the mother said their children preferred confectionaries like cakes, biscuit, and chocolates the most Children who were frequently eating crispy snacks and savory were at higher risk of caries than caries -free children .These snacks are most commonly well accepted by children as they are easily available, and sold in both small and big stores.

These snacks are low-priced and used as gift for children. Many times they are used as a replacement for other healthy food and was also reported by Carino et al..[21] Starch is regarded as a relatively low cariogenic carbohydrate. Human and animal experiments have found that starchy foods such as potatoes, rice, bread , and pasta

have low cariogenicity. However, if starch is finely ground, heat treated, and eaten frequently, it causes caries, probably less than simpler sugars. Additionally, salivary amylase can be reduced to simple sugars and consequently metabolized by bacteria by the starch which is present on the teeth. Starchy foods containing more amounts of sucrose is as cariogenic as a similar amount of sucrose.[22] The frequent ingestion of products like as throat lozenges and hard candies can be very harmful to the teeth. Anjum et al.[23] also did a similar study and stated that choice made by mother for food were not significant associated with caries status of their children and researchers concluded that improving knowledge may be insufficient to achieve behavioral change because nutritional knowledge and behavior are often poorly related.

CONCLUSION

The Gujarati version of the Food Frequency Questionnaire showed good test-retest reliability, acceptable internal consistency, and good construct and criterion validity. Slowly Dissolving and sticky sugars, Solid Sugars, Starchy and Solid Sugars, Liquid and Semisolid Sugars had shown highly significant carious exposure in S-ECC children in comparison to caries- free children. Cheese, popcorn, plain yogurt, rice, chass, coco these foods showed no significant relation to caries exposure in both groups.

RECOMMENDATIONS

Health education should focus on parental responsibilities for oral health and emotional support to their children with regard to oral hygiene habits. To provide information regarding how to promote infant oral health who is at risk of developing Early Childhood Caries should be targeted for specific effective preventive measures in our community.

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