

Assessment of Problematic Eating Behaviour and Dental Caries in Children

SUMMARY

Background/Aim: Eating behaviour in children has wide range from anorexia, to selective eating, fussy eater, neophobic/pouching of food & slow eating. Eating behaviour in childhood has been implicated in the development of dental caries and further affecting the body mass index of the child. The aim was to assess the Problematic Eating Behaviour (PEB) and its association with dental caries status of the child. **Material and Methods:** Parents of 150 children between 3-8 years of age were divided into 2 groups, Group A (3-5 years) and Group B (6-8 years). The parents completed the Children's Eating Behaviour Questionnaire (CEBQ) & the child's dental caries status was recorded. The collected data was subjected to statistical analysis using unpaired t test & Pearson's correlation coefficient test. **Results:** The results showed that the dental caries status was significantly higher in younger age group (3-5 years) than older age group (6-8 years). Further evaluating the PEB using CEBQ, there was no significant relation found between PEB and dental caries in younger age group of children (3-5 years), but in the older age group (6-8 years) the Factor 4 Desire to Drink ($p=0,274$) and Factor 5 Satiety Responsiveness ($p=0,291$) were significantly associated to the dental caries. **Conclusions:** Eating behaviour can contribute to the development of caries and this has been successfully studied with the use of CEBQ in the present study.

Key words: Children's Eating Behaviour Questionnaire (CEBQ), Desire to Drink (DD), Satiety Responsiveness (SR)

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ORIGINAL PAPER (OP)

Balk J Dent Med, 2019;88-92

Introduction

Dental caries is the most common communicable disease of childhood, affecting 41% of children in the United States (American Academy of Pediatrics [AAP], 2009; Centers of Disease Control and Prevention [CDC], 2005a)¹. The prevalence of early childhood caries worldwide is highly variable ranging from 2,1% in Sweden to 85,5% in rural Chinese children, whereas the prevalence in the USA is reported to be 11%–53,1%. The prevalence in the UK is 6,8%–12%. The prevalence of dental caries in India among preschool children varies from 19,2% to 71,1%. However, National Oral Health Survey 2002–2003 documented an average prevalence of 40,5% in Karnataka state and 40%–60% in the country².

Feeding problems during childhood are common concerns encountered in pediatric practice. Feeding disorder are reported to be present among 25% of children³. These 'troublesome eating behaviour's include picky and highly selective eating, food refusal, manifestation of negative affect and negativistic behaviour during eating, exceedingly slow eating, and having tantrums or angry outbursts during mealtimes⁴. Chatoor *et al.* reported that one in four parents who brought in their child for a routine pediatric checkup was concerned about their child's eating⁵, while Forsythe found that one third of mothers believed their infants experienced feeding difficulties, such as excessive spitting and excessive crying, during first four months of life⁶.

A number of psychometric instruments have been developed to assess eating behaviour in children, including the Children's Eating Behaviour Questionnaire (CEBQ)⁷, the Dutch Eating Behaviour Questionnaire (DEBQ)⁸, the Children's Eating Behaviour Inventory (CEBI)⁹ and the BATMAN (Bob and Tom's Method of Assessing Nutrition)¹⁰. The CEBQ is generally regarded as one of the most comprehensive instruments in assessing children's eating behaviour¹¹.

Experts have focused on problematic eating behaviours as risk factors for future eating and weight disorders. Marchi and Cohen established an association between "picky eating" in childhood and adolescent anorexia nervosa⁴. Similarly, Kotler *et al.* suggested that the occurrence of eating conflicts, struggles with food, and unpleasant meals during childhood predict the later development of eating disorders¹². Anandakrishan *et al.* have evaluated Problematic Eating Behaviour in childhood and found a positive co-relation with the development of Early Childhood Caries¹¹.

However, there is limited research in exploring this aspect. Against this background, the aim of the study was to assess the problematic eating behaviour and its relation to dental caries in children.

Material and Methods

The present study was conducted in Mumbai, Maharashtra, India. The study was approved by the institutional ethical committee and informed consent was obtained from the parents and students involved. Parents of 150 children between 3-8 years of age were divided into two groups, Group A (3-5 years) and Group B (6-8 years). The children were screened by a single examiner for the presence of Decayed Missing Filled Teeth and Decayed Missing Filled Surfaces scores and data were entered by a single assistant. The examination was done with the help of a mouth mirror and blunt probe in natural light. The results were recorded for both permanent and primary teeth.

The 35 itemed CEBQ Questionnaires (Table 1) were administered to parents of the children examined under the supervision of the principal investigator. All the collected data was subjected to statistical analysis. A total sample of 150 children was determined using the following formula: Sample size $n = [DEFF \times Np(1-p)] / [(d^2/Z^2_{1-\alpha/2} \times (N-1) + p \times (1-p))]$.

Table 1. Child Eating Behaviour Questionnaire (CEBQ)

Please read the following statements and tick the boxes most appropriate to your child's eating behaviour.

	Never	Rarely	Some-times	Often	Always	
My child loves food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EF
My child eats more when worried	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EOE
My child has a big appetite	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SR*
My child finishes his/her meal quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SE*
My child is interested in food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EF
My child is always asking for a drink	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DD
My child refuses new foods at first	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FF
My child eats slowly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SE
My child eats less when angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EUE
My child enjoys tasting new foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FF*
My child eats less when s/he is tired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EUE
My child is always asking for food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FR
My child eats more when annoyed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EOE
If allowed to, my child would eat too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FR
My child eats more when anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EOE
My child enjoys a wide variety of foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FF*
My child leaves food on his/her plate at the end of a meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SR
My child takes more than 30 minutes to finish a meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SE

	Never	Rarely	Some-times	Often	Always	
Given the choice, my child would eat most of the time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FR
My child looks forward to mealtimes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EF
My child gets full before his/her meal is finished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SR
My child enjoys eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EF
My child eats more when she is happy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EUE
My child is difficult to please with meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FF
My child eats less when upset	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EUE
My child gets full up easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SR
My child eats more when s/he has nothing else to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EOE
Even if my child is full up s/he finds room to eat his/her favourite food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FR
If given the chance, my child would drink continuously throughout the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DD
My child cannot eat a meal if s/he has had a snack just before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SR
If given the chance, my child would always be having drink	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DD
My child is interested in tasting food s/he hasn't tasted before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FF*
My child decides that s/he doesn't like a food, even without tasting it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FF
If given the chance, my child would always have food in his/her mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FR
My child eats more and more slowly during the course of a meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SE

Abbreviations: EF- Enjoyment of Food, EOE- Emotional overeating, SR- Satiety Responsiveness, SE- Slowness in Eating, DD- Desire to Drink, FF- Food Fussiness, EOE- Emotional over Eating, FR- Food Responsiveness

Statistical Analysis

The collected data tabulated in Microsoft Excel 2007 and was analyzed using IBM SPSS statistics 20.0 (IBM Corporation, Armonk, NY, USA) with statistical significance set at $p < 0.05$. The dental caries of the child was assessed using the unpaired t test and the eating behaviour of the child was evaluated using the Pearson's correlation coefficient test.

Results

Out of the total 150 participants, 79 were males and 71 were females (Table 2). Intergroup comparison of mean dmft and dmfs revealed that, the scores were higher in Group I (3 – 5 years) as compared to Group II and this difference was statistically significant. Table 3. shows the comparison of DMFS scores with the Children's Eating Behaviour Questionnaire revealed that factor 4 (Desire

to drink) and Factor 5 (Satiety Responsiveness) showed a positive correlation with the DMFS values in group II (6-8 years) (Table 4).

Table 2. Gender wise distribution of the study participants among both the groups using chi square test

		Gender		Total
		Male	Female	
Group 1	Count	41	34	75
	% within Group	54,7%	45,3%	100%
Group 2	Count	3	37	75
	% within Group	50,7%	49,3%	100%
Total	Count	79	71	150
	% within Group	52,7%	47,3%	100%

Chi square value: 0,241 P value: 0,624

Table 3. Comparison of deft and dmfs values in terms of Mean (SD) among both the groups using unpaired t test

Variable	Group	N	Mean	Std. Deviation	t value	P value
DMFT/ deft	Group 1	75	9.35	2.78	4.246	<0.001**
	Group 2	75	7.27	3.20		
DMFS/ dmfs	Group 1	75	16.56	4.56	2.459	0.015*
	Group 2	75	14.55	5.42		

(p<0,05 - Significant*, p<0,001 - Highly significant**)

Abbreviation: DMFT/deft- Decayed, Missing, Filled Tooth/decayed, extracted, filled tooth; DMFS/dmfs- Decayed, Missing, Filled Tooth Surfaces/decayed, missing, filled tooth surfaces

Table 4. Comparison of DMFS, DMFT Scores in relation to CEBQ Values using Persons correlation coefficient test for both the groups

CEBQ SCORES	DMFS (3-5 years)	DMFS (6-8 years)
F1 Food Responsiveness	0,196	-0,047
F2 Emotional Overeating	0,079	-0,121
F3 Enjoyment of Food	0,035	0,018
F4 Desire to Drink	-0,033	0,274*
F5 Satiety Responsiveness	-0,092	0,291*
F6 Slowness in Eating	-0,115	0,023
F7 Emotional under eating	-0,111	0,105
F8 Food Fussiness	0,045	-0,019

(p<0,05 - Significant*)

Abbreviation: F- Factor

Discussion

There is an increasing recognition that problematic eating behaviours that manifest in early childhood may be a precursor of disordered eating later in life⁴. The relationship between eating behaviours and dental caries is relatively unexplored.

Children between 3-8 years of age were included in our study to focus on the growing prevalence of early childhood caries. Children with any special health care needs, food allergies and children on any long term medication were excluded from the study. The children were divided into two groups: Group 1 (3-5 years) and Group 2 (6-8 years) on the basis of the WHO age grouping system for oral health surveys¹³.

The Problematic eating behaviour of children in the present study was identified using the Children's Eating Behaviour Questionnaire (CEBQ). The Children's Eating Behaviour Questionnaire was developed by Wardle *et al* to investigate the contribution of different eating style to the development of obesity⁹. The instrument was developed and validated in the United Kingdom, and recently the instrument has been validated in the Portuguese sample¹⁴.

The questionnaire consists of 35 questions divided into 8 subscales each containing 3 to 6 items. Parents are asked to rate their child's eating behaviour on a five-point

Likert scale (never, rarely, sometimes, often, and always). Out of the 8 subscales, 4 subscales show an interest in food – Food Responsiveness (FR), Enjoyment of Food (EF), Desire to Drink (DD), Emotional over Eating (EOE). Four subscales show lack of interest in food – Emotional under Eating (EUE), Satiety Responsiveness (SR), Slowness in Eating (SE), Food Fussiness (FF)¹⁵.

The results of the present study revealed that the mean dmfs was higher in the younger age group as compared to the older age group. This is probably because the exchange of incisors occurs between 6-8 years of age and with exfoliation of carious primary incisors, the dmfs scores tends to decrease. The results are in accordance with the study by Kuraikose *et al.* who reported an increased prevalence of caries in younger children¹⁶.

The present study showed that there was a positive correlation between the factor 4 (Desire to drink) and Factor 5 (Satiety Responsiveness) of the CEBQ with the DMFS values in Group 2 (6-8 years).

Desire to drink comprises of 4 questions which help to evaluate the intake of any type of beverage. This factor showed a positive correlation with caries since it is the need to have something in the mouth at all times; if such an individual is offered caloric drinks it could lead to dental caries in children. Similar results were found when the children consumed beverages with added sugar (soda pop) when compared with 100% fruit juice¹⁷, carbonated soft drinks¹⁸, powdered/sport drink consumption¹⁹, soft drinks when compared to milk and 100% fruit juice²⁰, sugar sweetened beverages²¹, drinks containing free sugars²².

Satiety responsiveness comprises of 5 questions which helps to evaluate reduction in food intake to compensate for a prior snack. In children between 6–8 year of age, higher Satiety Responsiveness score resulted in increased Dental Caries. Such a trend was not seen in 3–6 year old children probably because the children in this age group where mainly fed by their parents and they spend most of the time under the supervision of their parents when compared to the older age group. Similar results have been reported in previous studies when increased exposures of starches were seen during snacking¹⁶ or presence of sugar consumption between meals²³ of children who had the tendency to keep food in the mouth all the time¹⁵. Anandkrishnan *et al.* used CEBQ to assess the ECC and problematic eating in 3-6 year old children and concluded that factor 1 (food responsiveness) had a significant difference between children with and without caries because increase food exposure leads to increased demineralization. They also reported emotional overeating (child eats more when he/she does not have anything to do) to be a significant factor in children with increased dental caries¹⁵.

Conclusions

Eating behaviour can contribute to the development of caries and this has been successfully studied with the use of CEBQ in the present study.

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Conflict of Interests: Nothing to declare.

Financial Disclosure Statement: Nothing to declare.

Human Rights Statement: All the procedures on humans were conducted in accordance with the Helsinki Declaration of 1975, as revised 2000. Consent was obtained from the patient/s and approved for the current study by national ethical committee.

Animal Rights Statement: None required.

Received on July 2, 2018.

Revised on September 20, 2018.

Accepted on November 12, 2018.

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