

Original Article

Characteristics of Breast-fed Children with Nursing Caries

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Received 12 January, 2007/Accepted for publication 9 February, 2007

Abstract

The aim of this study was to investigate the characteristics and risk factors of prolonged breast-feeding in children. A total of 105 children aged 18 months were screened for ongoing breast-feeding at a public health center. Of these, 105 children were selected for a more comprehensive examination, involving investigation of dietary, tooth-brushing habits and oral hygiene. The children were examined again, and initial and manifest caries were recorded at 24 months of age. As a result, 20 (19.0%) of the 105 children had caries at 24 months of age. Logistic regression analysis revealed an association between caries and bedtime breast-feeding ($p=0.003$). Oral hygiene at 18 months of age was also correlated with caries ($p=0.015$). It was concluded that reducing the frequency of feeding, early establishment of good oral hygiene habits and also regular visits to the dentist are essential in preventing nursing caries in prolonged breast-fed children.

Key words: Dental caries—Breast-feeding—Risk factor—Japanese infant

Introduction

Breast-feeding has been promoted in the WHO Innocenti Declaration¹⁸⁾. Many authorities recommend that children should be breast-fed up to the age of 6 months. On the other hand, some organizations encourage unrestricted feeding habits to comfort children over prolonged periods of time. An example of the latter is the La Leche League, an international organization that encourages and supports mothers who breast-feed their children, claiming that breast-feeding is the most natural way to achieve a healthy and close relationship with the child. It is not unusual for such children to sleep in their parent's bed, and many are still breast-fed for

comfort beyond 18 months of age.

On the other hand, a high caries prevalence in children undergoing prolonged breast-feeding was reported by several clinicians^{3,4,7,11,16,17)}. We also found that children breast-fed at 18 months of age were several times more likely to have dental caries at 2 years of age than prolonged bottle-fed children²⁰⁾.

However, this study did not answer the question of why prolonged breast-feeding was correlated with more dental caries. In addition, Yonezu & Machida¹⁹⁾ indicated that, children developing caries before 2 years of age were at greater risk for dental caries. Thus, it is therefore important to identify factors related to dental caries among breast-fed children as soon as possible and develop

Table 1 Dental caries experience at 24 months of age and oral health behaviors

		n	Caries prevalence (%)	p
Bedtime breast-fed	yes	55	32.7	0.003**
	no	50	4.0	
Sweets intake	3 times-/week	33	24.2	0.387
	-2 times/week	72	16.7	
Sweet beverages intake	3 times-/week	41	14.6	0.999
	-2 times/week	64	21.9	
Tooth brushing	irregularly	31	24.2	0.219
	daily	74	18.9	
Oral hygiene at 18 month's exam	poor	14	71.4	0.015*
	good	91	11.0	

*: $p < 0.05$, **: $p < 0.01$

effective preventive programs.

The aim of this study was to investigate the characteristics and risk factors of prolonged breast-feeding in children.

Materials and Methods

All infants in this study took part in preventive dental care programs at public health centers in accordance with the recommendations of the Japanese National Board of Health and Welfare.

This study was carried out during 2003–2005. A total of 105 children aged 18 months were screened for ongoing breast-feeding at the same public health center. Of these, 105 children were selected for a more comprehensive examination, involving investigation of dietary, tooth-brushing habits and oral hygiene. Using a questionnaire designed for this study, the parents were asked, after the time of the examination, about their dental health habits. Parents were asked to give consent to the study and fill out questionnaires at every dental examination. The children were examined again, and initial and manifest caries were recorded at 24 months of age.

Data analysis

Descriptive and analytical techniques were conducted using the SAS program. The chi-

square test for categorical variables was used for comparisons of proportions. A logistic regression model was used to identify risk factors for caries development at 24 months of age among children being breast-fed at 18 months of age. An odds ratio (OR) and 95% confidence interval (CI) for dental caries experience was determined for each variable, and modeling was carried out using logistic regression analysis to identify the determining factors for disease presence.

Results

Nine (8.6%) of the 105 children still breast-fed had caries at 18 months of age, and 20 (19.0%) had caries at 24 months of age.

The relationship between oral health behaviors and caries at 24 months of age is shown in Table 1. The results of logistic regression analysis are shown in Table 2. Consideration of 5 independent variables revealed that bedtime breast-feeding was a statistically significant factor ($p < 0.01$). Oral hygiene at the 18-month examination was also statistically significant among these independent variables ($p < 0.05$). The odds for caries experience at 24 months of age was significantly higher (OR = 10.66) for bedtime breast-fed children than no bedtime breast-feeding children. Children whose oral hygiene was

Table 2 Results of logistic regression analysis of effect of variables for caries (Experience at 24 months of age)

Variables	OR	95% CI
Bedtime breast-fed	10.66	2.23–50.96
Sweets intake	1.93	0.43– 8.60
Sweet beverages intake	0.99	0.25– 4.01
Tooth brushing	1.88	0.69– 5.19
Oral hygiene at 18 months of age	4.07	1.31–12.61

evaluated as “poor” at the 18-month oral examination had significantly higher odds for dental caries compared with children evaluated as “good” (OR = 4.07).

Discussion

The correlation between prolonged breast-feeding and caries status has been investigated since the 1980s^{3,4,7,11,16,17}. However, the results of these studies, and also the cariogenic potentials of human milk are contradictory. Erickson & Mazhari⁵ reported that human milk did not cause significant plaque pH reduction and, consequently, enamel decalcification. On the other hand, Ripa¹⁰ reported that human milk is not considered to be a cariogenic agent under normal dietary conditions, but repeated and prolonged exposure leads to a larger decrease in plaque pH. More recently, it was shown that after prolonged contact human milk has a considerable acidogenic potential, and it was found to soften the enamel to a greater extent than bovine milk^{8,13}. The cariogenic potential of human milk was also mentioned in case reports and studies of children breast-fed on demand over a protracted period. In addition, previous studies reported that *ad libitum* breast-feeding during sleep resulted in higher Ms counts in dental plaque and more dental caries among young children^{2,9,12,14}. The results of this study confirm these findings. The odds ratio for caries experience at 24 months of age was significantly higher (OR = 10.66) for bedtime breast-fed children than no bedtime breast-

feeding children. Thus, the results of the present studies suggest that there is a potential harm in continuing bedtime breast-feeding beyond a certain age, with greater risk of developing dental caries as breast-feeding continues, particularly if it continues for 18 months and beyond. Therefore, parents should be instructed to reduce bedtime breast-feeding. Furthermore, breast-fed infants should be evaluated between 12 and 18 months of age. Since there is an inherent need for bedtime breast-feeding to comfort infants, any recommendations to prohibit bedtime breast-feeding or tooth-brushing after feeding may be unwarranted and unrealistic.

On the other hand, In this study, when plaque was visible on tooth surfaces at the oral examination in breast-fed children, they were more likely to have developed caries 6 months later. Children whose oral hygiene was evaluated as “poor” at the 18-month oral examination had significantly higher odds for dental caries than children evaluated as “good” (OR = 4.07). Wendt & Birkhed¹⁶ reported that if the habit of daily brushing is established as early as the age of 1 year, children are more likely to be free of caries by the age of 3. However, the present study showed that there was no close relationship between number of brushing times and caries development. This may indicate that parents have difficulty in achieving a good brushing technique, and that the method in use may be unpleasant to the child. Also, we always have to recognize that the quality of the cleaning is more important than its frequency. Therefore, parents should be encouraged to brush

their child's teeth as soon as the primary teeth erupt. Furthermore, suitable training in brushing technique should be given to parents by the time their child is 18 months of age.

Contrary to the present study, Abbey¹⁾ and Weerheijm *et al.*¹⁵⁾ did not consider prolonged breast-feeding harmful for the dentition. Nevertheless, in their work, recommendations (adopted by La Leche League) were made, such as brushing as soon as the teeth erupted, supplementation of fluoride if not available in the water, restriction of carbohydrates and regular visits to the dentist before the age of 24 months. The parents of the children examined were highly motivated for their dental check-ups and most mothers were aware of their children's tooth decay and sought advice concerning oral health. It cannot be excluded that this influenced participation in their study.

Hallonsten *et al.*⁶⁾ suggested that breast-feeding *per se* might be a risk factor for caries. They indicated that children with prolonged breast-feeding had a tendency to establish unsuitable dietary habits, which constituted a risk situation for the development of caries at an early age. However, in the present study there were no differences between the non-caries and caries children according to number of sweets or sweet beverages consumed.

In conclusion, early establishment of good oral hygiene habits, reducing the frequency of breast-feeding and also regular visits to the dentist are essential in preventing nursing caries in prolonged breast-fed children.

Acknowledgements

We wish to thank Prof. Matsukubo for his assistance with the statistical analysis.

References

- 1) Abbey LM (1979) Is breast feeding a likely cause of dental caries in young children?. *J Am Dent Assoc* 98:21–23.
- 2) Alaluusua S, Myllarniemi S, Kallio M, Salmenpera L, Tainio V-M (1990) Prevalence of caries and salivary levels of mutans streptococci in 5-year old children in relation to duration of breast feeding. *Scand J Dent Res* 98:193–196.
- 3) Derkson GD, Ponti P (1982) Nursing bottle syndrome; prevalence and etiology in a non-fluoridated city. *J Can Dent Ass* 48:389–393.
- 4) Dilley GJ, Dilley DH, Machen JB (1980) Prolonged nursing habit: a profile of patients and their families. *J Dent Child* 47:102–108.
- 5) Erickson PR, Mazhari E (1999) Investigation of the role of human breast milk in caries development. *Pediatr Dent* 21:86–90.
- 6) Hallonsten AL, Wendt LK, Mejare I, Birkhed D, Hakansson C, Lindvall AM, Edwardsson S, Koch G (1995) Dental caries and prolonged breast-feeding in 18-months-old Swedish children. *Int J Paediatr Dent* 5:149–155.
- 7) Johnsen DC (1982) Characteristics and backgrounds of children with "nursing caries". *Pediatr Dent* 4:218–224.
- 8) Kotlow LA (1977) Breast feeding: A cause of dental caries in children. *J Dent Child* 44:192–193.
- 9) Matee MI, Mikx FH, Maselle SY, Van Palenstein Helderma WH (1992) Mutans streptococci and lactobacilli in breast-fed children with rampant caries. *Caries Res* 26:183–187.
- 10) Ripa LW (1988) Nursing caries: A comprehensive review. *Pediatr Dent* 10:268–282.
- 11) Roberts GJ (1982) Is breast-feeding a possible cause of dental caries?. *Pediatr Dent* 10:346–352.
- 12) Roberts GJ, Cleaton-Jones PE, Fatti LP, Richardson BD, Sinwel RE, Hargreaves JA (1994) Patterns of breast and bottle feeding and their association with dental caries in 1- to 4-year-old South African children. 2. A case control study of children with nursing caries. *Community Dent Health* 11:38–41.
- 13) Thomson ME, Thomson CW, Chandler NP (1996) *In vitro* and intra-oral investigations into the cariogenic potential of human milk. *Caries Res* 30:434–438.
- 14) van Haute J, Gibbs G, Butera C (1982) Oral flora of children with 'nursing bottle caries'. *J Dent Res* 61:382–385.
- 15) Weerheijm KL, Uyttendaele-Speybrouck BFM, Euwe HC, Groen HJ (1998) Prolonged demand breast-feeding and nursing caries. *Caries Res* 32:46–50.
- 16) Wendt L-K, Birkhed D (1995) Dietary habits related to caries development and immigrant status in infants and toddlers living in Sweden. *Acta Odontol Scand* 53:339–344.

- 17) Williams SA, Hargreaves JA (1990) An inquiry into the effects of health related behavior on dental health among young Asian children resident in a fluoridated city in Canada. *Community Dent Health* 7:413–420.
- 18) World Health Organization (1989) *Breast-feeding in the 1990s: a Global Initiative*. Geneva.
- 19) Yonezu T, Machida Y (1998) Caries development in children from 1.5 to 3 years of age: A longitudinal study. *Bull Tokyo Dent Coll* 39:25–29.
- 20) Yonezu T, Ushida N, Yakushiji M (2006) Lon-

gitudinal study of prolonged breast- or bottle-feeding on dental caries in Japanese children. *Bull Tokyo Dent Coll* 47:157–160.

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