

Original Article

Longitudinal Study of Prolonged Breast- or Bottle-feeding on Dental Caries in Japanese Children

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Abstract

The aim of this investigation was to study the effects of prolonged breast- or bottle-feeding on dental caries in Japanese infants. This longitudinal study was conducted by means of a questionnaire and clinical examination of 592 children at 18 months, 2 years and 3 years of age. The children were divided into three groups: 1) children still being breast-fed at 18 months of age ($n = 42$); 2) children still being bottle-fed at 18 months of age ($n = 45$); and 3) children weaned off of breast- or bottle-feeding and with no non-nutritive-sucking habits at 18 months of age ($n = 205$). Results showed that breast-feeding at 18 months of age produced many significant differences to the control children, including a higher prevalence of caries and higher number of dft. However, no significant differences were observed between bottle-fed and control children. In conclusion, our results suggest that prolonged breast-feeding at an early age before primary dentition has fully erupted is a risk factor for dental caries. Therefore, breast-fed children need to be monitored more closely, and aggressive methods of preventive care need to be instituted. It is also important to identify factors related to dental caries among breast-fed children as soon as possible, and develop effective preventive programs.

Key words: Dental caries—Bottle-feeding—Breast-feeding—Japanese infant—Longitudinal study

Introduction

According to our previous study¹⁷⁾, the mean dft at 3 years of age in children developing caries before 2 years of age was significantly greater than that in children caries free at 2 years of age. The finding of this study indicates that children who develop caries before 2 years of age are at greater risk for dental caries.

O'Sullivan & Tinanoff¹⁰⁾ reported that the

anterior teeth of the primary dentition were the first teeth to erupt, and that they were immediately susceptible to carious attack if the child was exposed to inappropriate nursing habits resulting in infection by cariogenic micro-organisms. This early infection has been suggested as the determining factor in disease progression onto other teeth. Nursing caries is commonly associated with incorrect feeding habits in infants^{3,4,7,11)}. Not only bottles containing sweetened beverages, but also

Table 1 Number and proportion of children with caries at 18 months, 24 months and 36 months of age among those still being breast-fed or bottle-fed at 18 months of age and among those not being breast- or bottle-fed (control group)

		N(%)		
	No. of children	18 months of age	24 months of age	36 months of age
Being breast-fed	42	5 (11.9)	6 (14.3)	14 (33.3)
Being bottle-fed	48	2 (4.2)	4 (8.3)	8 (16.7)
Control	205	4 (2.0)	11 (5.4)	35 (17.1)

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

prolonged breast-feeding is considered to be a contributing factor to the development of caries in early childhood.

The aim of this investigation was to study the prevalence of dental caries and its relationship with prolonged breast- or bottle-feeding in Japanese infants.

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 designed as a prospective study starting with children at 18 months of age. Cohort children were born in 1997–99 and visited a public health center in “K” city, Tokyo for regular dental examinations. We examined 922 children at 18 months, 742 children at 24 months and 910 children at 36 months of age. Of the 1,120 children examined, 592 (52.9%) were followed longitudinally. All children were Japanese, in good general health, and had age-appropriate cognitive development.

Patients were asked to give consent to the study and fill out questionnaires at every dental examination. The questionnaire included questions on feeding methods and the child’s past and present breast- or bottle-feeding habits.

Dental examinations were carried out using a mirror, an explorer, and an ordinary examination light. In each case, the examiner was

blind to the child’s questionnaire data. The presence or absence of dental caries, including initial carious lesions, was recorded for all erupted tooth surfaces. Initial caries was defined as a demineralized surface with a chalky appearance, but without macroscopic loss of tooth substance, manifest caries was defined as the minimal level that could be verified as a cavity by probing.

The chi-square test or Fisher’s exact test for categorical variables were used for comparisons of proportions. The significance of differences between multiple groups was assessed by an analysis of variance, according to the Turkey-Kramer test. Control samples consisted of 205 children weaned off of breast- or bottle-feeding before 18 months of age with no oral habits such as non-nutritive sucking habits at 18 months of age.

Results

The results in Table 1 show that 42 of the 592 children (7.1%) were still being breast-fed at 18 months of age. Forty-eight children (8.1%) were still being bottle-fed. Five (11.9%) of the 42 children still being breast-fed had caries, compared to 4 (2.0%) of the 205 children not being breast- or bottle-fed at 18 months of age; the difference was statistically significant ($p < 0.01$). On the other hand, only 2 (4.2%) of the 48 children still being bottle-fed had caries.

Table 1 also shows that 6 (14.3%) of the 42 children being breast-fed had caries at 24

Table 2 Caries experience of (dft) distributed according to breast-fed or bottle-fed at 18 months of age

	No. of children	Mean dft		
		18 months	24 months	36 months
Being breast-fed	42	0.36	0.51	1.27
Being bottle-fed	48	0.17	0.34	0.85
Control	205	0.06	0.11	0.54

*: $p < 0.05$

months of age, compared to 11 (5.4%) of the 205 children not being breast- or bottle-fed: the difference was statistically significant ($p < 0.05$). However, only 4 (8.3%) of the 48 children being bottle-fed at 18 months of age had caries.

One third of the children being breast-fed at 18 months of age had dental caries at 36 months of age. However, there was no significant difference with the other groups.

Table 2 shows the mean dft of the children in the 3 groups at 18 months, 24 months and 36 months of age. The mean dft of the children being breast-fed at 18 months of age was 0.37 at 18 months of age and 0.51 at 24 months of age. These dft data were statistically significant in children who were not being breast- or bottle-feeding at 18 months of age. The mean dft of breast-fed children was 1.27 at 36 months of age. However, the differences were not statistically significant between bottle-fed children and those not being breast- or bottle-fed children.

Discussion

Breast-feeding has been promoted in the WHO Innocenti Declaration¹⁶⁾. Many authorities recommend that children should be breast-fed up to the age of 6 months. Weaning is recommended at 8–13 months, after which the child should start to eat the same food as the rest of family. Consequently, a trend towards longer breast-feeding has been reported in many western countries. In Japan, breast-feeding has also become more com-

mon during the last few decades.

On the other hand, in the late 1970s and early 1980s, a high caries prevalence in children undergoing prolonged breast-feeding was reported by several clinicians^{3,4,7,11)}. In addition, in studies by Williams & Hargreaves¹⁵⁾ and Wendt & Birkhed¹⁴⁾, an association between prolonged breast-feeding and caries was demonstrated. However, Alaluusua *et al.*¹⁾ and Roberts *et al.*¹²⁾ found no correlation between breast-feeding and caries prevalence. Thus, the results of these studies concerning the association between breast-feeding habits and caries prevalence are contradictory.

We found that children who were breast-fed at 18 months of age were 3 times more likely to have dental caries at 2 years of age than those who had been weaned before 18 months of age. We also found that prolonged breast-fed children were more likely to have dental caries than prolonged bottle-fed children. This finding is in accordance with the results of the study by Eronat & Eden⁵⁾, who found that most children with rampant caries were breast-fed for longer than 12 months. Li *et al.*⁸⁾ also reported that children who were breast-fed more than 9 months were 5 times more likely to have dental caries at 3 years of age than those who had not been breast-fed.

However, this study did not answer the question of why prolonged breast-feeding was correlated with more dental caries among these children. 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^{9,13)}. Other factors associated with this

high caries incidence may be the cariogenic potential of human milk and the tendency to eat other more cariogenic food⁶⁾. In addition, some investigators reported that prolonged breast-feeding might be influenced by the infant's behavior²⁾. Therefore, breast-fed children need to be monitored more closely, and aggressive methods of preventive care need to be instituted.

In conclusion, our results show that children breast-fed at an early age before the primary dentition has fully erupted may develop caries. It is therefore important to identify the factors related to dental caries among breast-fed children as soon as possible and to develop effective preventive programs.

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