The Potential Role of Breast-Feeding and Other Factors in Helping to Reduce Early Childhood Caries

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Abstract

Objectives: *Dental caries is the most common chronic disease in US children. Early childhood caries (ECC) is particularly virulent and can interfere with a child's ability to eat, grow, speak, and communicate. Studies on whether breast-feeding or bottle-feeding are more likely to reduce ECC have proven inconclusive.* ***Methods:*** *The study population included 175 children, aged 1 to 5, receiving dental care at the Hughes Spalding Children's Hospital in Atlanta, GA. Participation included a dental exam, chart data abstraction, and a personal interview with the mother.* ***Results****: Too few exclusively breast-fed children prevented the adequate study of breast-feeding. However, children exclusively bottle-fed for at least 1.5 years had more decayed or filled tooth surfaces than children breast-fed part of that time but well short of a year. No bottle at night nor juice at irregular times, the mother's brushing of her child's teeth, and adequate dental care in the mother seemed to reduce ECC.* ***Conclusions****: Our results suggest measures that might reduce ECC risk. Medical providers must discuss oral health with new mothers and educate them on the important role they play in keeping their babies' teeth healthy.*

Key Words: breast-feeding, caries, ECC, dfs

Introduction

Dental caries is the single most common chronic disease among US children, occurring five to eight times more frequently than asthma, which is second most common (1), and early childhood caries (ECC) is a particularly virulent form that affects infants, toddlers, and preschool children. If untreated, oral disease in children can lead to serious health problems, significant pain, interference with eating, overuse of the emergency room, and loss of school time (2). Severe ECC often affects a child's ability to eat and grow properly, speak, and communicate. Children disadvantaged by poverty, minority status, and social conditions tend to experience higher rates of dental caries, more extensive destruction of their dentition when affected, higher rates of untreated diseases, and higher frequency of dental pain than affluent children (3). Progression and prognosis of dental caries varies with many cofactors, including microbiology, lifestyle behaviors, comorbidities, medication effects, tooth site, tooth surface, socioeconomic status, ethnicity, and early intake of sugary foods, drinks, or snacks (4).

Inappropriate feeding of children can lead to a typical nursing decay pattern. Inappropriate feeding may include: a) a child being given a bottle with milk or a sweetened liquid at bedtime; and b) a child being given a bottle or "sippy" cup (sweetened fluids) frequently before or after meals. The sweetened liquid pool around the tooth surfaces and, combined with bacteria present in the mouth, makes an acid by-product, which causes a demineralization and breakdown of the enamel surface of the tooth and, over a period of time, leads to tooth decay (4,5). It is not clear what role, if any, breast-feeding might play with respect to dental caries in children. The purpose of this study was to examine the differences between breast-feeding and bottle-feeding as protection against ECC.

Methods

This study was performed on a convenience sample of children receiving their dental care at the Pediatric Dental Clinic (PDC) at the Hughes Spalding Children's Hospital in Atlanta, GA. The PDC was established in December 1999 to address a recognized need for pediatric oral health care among very low-income and uninsured minority patients in metropolitan Atlanta. Over 13 percent of the total patient population presents with ECC, 67 percent of whom are African-American, 29 percent Hispanic, and 4 percent Caucasian. Among the Latino patients, 42.1 percent present with ECC.

The investigators developed the study interview questionnaire and chart abstraction form and obtained IRB approval. Four focus groups helped the investigators develop the questionnaire. It was translated into Spanish, enabling the interview to

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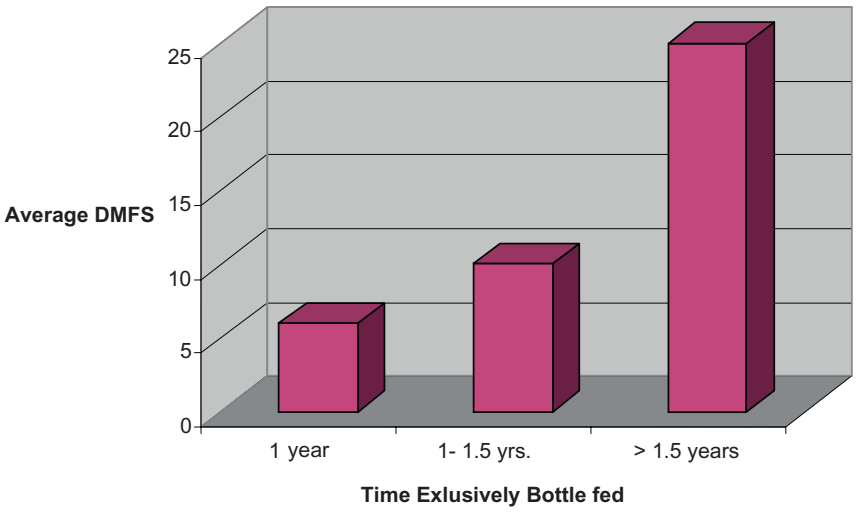
Figure 1
Average DMFS in Children Exclusively Bottle Fed 1 year or more



be conducted in Spanish using an English/Spanish interpreter.

This study was originally conceived as a case–control study, with the cases being children aged 1 to 5, attending the clinic, and having at least one decayed or filled tooth surface (dfs), and the control group being children aged 1 to 5, attending the clinic, and with no dfs. Cases and controls were to be compared with respect to exclusive breast-feeding versus bottle-feeding. However, because we were only able to obtain seven children who were exclusively breast-fed for more than 6 months, we decided to treat this as a purely descriptive study.

The PDC dentist determined patient eligibility for the study: a child 1 to 5 years old whose mother was available for an interview. She referred the mother of each eligible child to the program coordinator/research associate (PCRA), who explained the study and asked her whether she would like to participate with her child. Each mother agreeing to participate signed an informed consent form and was interviewed by the PCRA then or at a more convenient time. The interview included questions on the child's birth, medical and feeding histories, traditional ECC risk factors, frequency of the mother's dental visits, and her oral health knowledge. The PDC dentist performed a dental examination on the child and noted in the child's dental chart which teeth and surfaces were decayed, as was done with any child seen at the PDC, irrespective of the study. The PCRA abstracted the pertinent information from the chart, which had been recorded by the dentist, and entered it and the interview data into a database.

Results

The study population consisted of 175 children. There were seven children who were exclusively breast-fed, one for 7-8 months, four for 9-10 months, and two for at least 11 months, and 168 who were not exclusively breast-fed for more than 6 months. This made it impossible to determine whether breast-feeding or bottle-feeding protects against ECC. However, it was possible to compare the children exclusively bottle-fed for extended periods of time (64 for 1 year, 14 for 1.5 years, and 12 for over 1.5 years) with each other. For these children, the average dfs increased from six for 1 year, to 10 for 1.5 years, to 25 for over 1.5 years (Figure 1). The percentage of these children with at least one dfs rose with the increasing length of exclusive bottle-feeding from 59.4 to 78.6 to 91.7 percent. The percentage with at least three dfs increased from 40.6 to 71.4 to 83.3 percent, with the increases being statistically significant based on a Chi-square test ($P \leq 0.01$). The children breast-fed for part of the time but well short of a year tended to have less decay than those children exclusively bottle-fed for at least 1.5 years. While the 12 children exclusively bottle-fed for over 1.5 years had a mean dfs of 25, the 10 children who also had some breast-feeding had a mean of about 16. In addition, while the 14 children exclusively bottle-fed for 1.5 years had a mean dfs of 10, the 16 children who also had some breast-feeding had a mean of about 6.

As seen in Table 1, children who received a bottle at night had more dfs than those who did not (nine versus six). Among the former, 69.1 percent had at least one dfs and 54.4 percent had at least three dfs, compared with 54.3 and 42.9 percent, respectively, among the latter. These differences were not statistically significant. Children who drank Similac formula were slightly more likely to have at least three dfs than those drinking Enfamil, with the difference not being statistically significant (Table 1). Almost 59 percent of the children whose mothers had regular dental visits had at least one dfs compared with 68.5 percent of the children whose mothers did not. The difference was even larger for children having at least three dfs, but statistical significance was still not achieved (Table 1). Nearly all of the mothers gave Juicy Juice to their children (data not shown). Juicy Juice contains a high percentage of natural sugar and is a supplement provided by WIC to mothers with infants.

Over 90 percent of the participating children were African-American, and they had about half as many dfs as the Hispanic/Latinos (Table 1). Among the African-Americans, 63.3 percent had at least one dfs and 49.3 percent had at least three dfs, compared with 87.5 and 75 percent, respectively, among the Hispanic/Latinos. The Hispanic/Latinos were more likely than the African-

Table 1
Dental Decay by Potential Risk or Protective Factors for Early Childhood Caries among Children Aged 1 to 5

Variable	Number of subjects	Average number of dfs	% with ≥1 dfs	% with ≥3 dfs
Taking medication(s)				
Yes	112	8	60.7	46.4
No	59	10	76.3	62.7
Medical problem(s)				
Yes	74	8	60.8	48.7
No	94	9	69.2	53.2
Taking bottle at night				
Yes	136	9	69.1	54.4
No	35	6	54.3	42.9
Mom brushes child's teeth				
Yes	122	8	65.6	48.4
No	47	10	66.0	59.6
Delivery				
Full term	26	9	57.7	46.2
Premature	142	9	67.6	52.8
Formula				
Enfamil	64	8	62.5	46.9
Similac	77	9	66.2	54.6
Both	10	7	60.0	50.0
Mother's dental visit frequency				
Rare	130	9	68.5	55.4
Regular	41	9	58.5	41.5
Race/ethnicity				
African-American	150	8	63.3	49.3
Latino/Hispanic	16	16	87.5	75.0

Unknowns are excluded for each potential risk or protective factor, so the total numbers of participants for each factor may be less than 175.
dfs, decayed or filled tooth surface.

Americans to have at least three dfs in both their front and rear teeth (front: 62.5 versus 35.3 percent; rear: 75 versus 47.3 percent; data not shown). These differences were not statistically significant.

Discussion

In planning the study, we took into account that African-American women are far less likely than White women to breast-feed their children (30 versus 65 percent) (5). However, it was hoped that the inclusion of Hispanic women, who are more likely to breast-feed, as well as the fact that Grady Hospital, an Atlanta city hospital where many of the PDC-treated children are born, has an active lactation-promotion program, would enable us to enroll an adequate number of exclusively breast-fed children. Unfortunately, that proved not to be the case. The paucity of exclusively breast-fed children may, in part, be attributable to the fact that all women and children involved in the study were WIC recipients. A recent report showed that women on public insurance were one-third less likely to breast-feed than privately insured women (6).

Despite its inability to shed light on the question on whether breast-feeding is beneficial in preventing ECC because of the small number of exclusively breast-fed children, this study did yield some interesting findings that warrant further exploration. The finding that children drinking Similac were slightly more likely to have at least three dfs than those drinking Enfamil might be important as the US government-sponsored WIC program promotes both types of formula to program participants, and both formulas contain the same percentages of carbohydrate and fat. The finding that children whose mothers had regular dental visits had fewer caries than children whose mothers did not suggests that dental care among the mothers translates into better dentition for their children.

Conducting another study with many more children who have been exclusively breast-fed for various lengths of time would be useful. Because in this study over 25 percent of the Latino children were exclusively breast-fed compared with less than 5 percent of the African-American children, it would be expected that recruitment of recently immigrated subjects from local Latino clinics might provide more exclusively breast-fed children. The mother's perception of the importance of her teeth, the effects of parents brushing their children's teeth, the use of a "sippy" or training cup by the child to drink sugared beverages such as Juicy Juice, and the type of formula consumed are all factors that warrant further examination.

Our results suggest several measures that might reduce the risk of ECC. One such measure might be for

the WIC to reduce the amount of juice allocated to mothers for their infants and to inform mothers about the sugar content of these juices and its potential role in ECC. WIC's promotion of juice may be misinterpreted by mothers as a substitute for water. It is imperative that medical providers discuss oral health with young mothers and provide education on the important role that they themselves can play in keeping their babies' teeth healthy.

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