

Background comparisons of pre-3½-year-old children with nursing caries in four practice settings

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Abstract

Background information was compared for children with carious primary incisors versus caries-free children in different geographic and practice locations: private practices in Baton Rouge, Louisiana, and Akron, Ohio, and university-affiliated clinics in Cleveland, Ohio, and Morgantown, West Virginia. In several respects nursing caries cuts across geographic boundaries and practice settings. Data were similar among study sites for: family size, age of the child when lesions were first noticed, mother's optimism about her own dentition, awareness of cariogenicity from sleeping with the bottle, and getting the child to accept water in the bottle. Data in this study are interpreted to support the notion that nursing caries frequently is related to parental overindulgence or lack of control.

Nursing caries is a distinct clinical entity. Studies have described the teeth involved, etiology, infectious nature, demographics for certain populations and contributing social/attitudinal factors. Few studies have compared the backgrounds of children with nursing caries in different geographic locations and in different practice settings. If differences exist, there may be important implications for prevention and treatment interventions.

The caries pattern associated with excessive bottle feeding is distinctive with minor variations. Maxillary primary incisors are carious in all descriptions of this affliction; more than one incisor is involved.¹⁻⁴ A common finding is that one surface of each incisor is most severely involved for a given patient. The incisal edge is the surface least often involved.^{3,4} Maxillary and mandibular first primary molars are frequently carious with the occlusal surface most commonly affected. The lesions are first noticed by the parents at about 20 months.⁴

Etiology of this caries pattern has been established as excessive bottle feeding with milk or other fermentable liquid in the bottle.⁵⁻¹⁰ Instances of carious incisors associated with excessive breast feeding also have been suggested.^{11,12}

Some evidence indicates that nursing caries is an infectious process characterized by microbial specificity;^{13,14} *Streptococcus mutans* has been identified as the important pathogen. Therefore, children that harbor this pathogen as part of their oral flora are at significant risk for developing nursing caries. The relationship of organism acquisition to this disease appears to be significant and should be clarified further.

One differential diagnosis is enamel hypoplasia.⁴ Teeth of the premaxilla (primary incisors) were involved most frequently in children from underdeveloped countries.¹⁵⁻¹⁷ The exact etiology has not been established, but may relate to a different level of nutrition to the premaxilla during embryonic and fetal stages of development. Hypoplasia also has been reported in preterm low birth-weight infants and in children with cerebral palsy.^{18,19}

Demographic and socioeconomic factors have been studied to some extent in institution populations.^{3,4} The suggestion has been made that nursing caries may be due to overindulgence and not abuse. Prior awareness of the hazards of excessive nursing by parents also has been suggested.⁴

The purpose of this study is to examine demographic, social, and attitudinal characteristics of children with nursing caries in different geographic and practice settings.

Methods and Materials

Subject selection was based on age and dental criteria. Consecutive children age three and one-half years or

younger and presenting for a dental examination were considered. Radiographs were not a criterion for inclusion since they were not available in all cases. Inclusion in the study was based on dental caries pattern and not a nursing history. The rationale was that a study conducted at widely dispersed sites would be more sound if information was based on present attitudes or dichotomous data from previous experience; the history of nursing duration and frequency would depend on parents' memories and the questionnaire.

Children were included in the incisor caries group if three incisors had carious lesions which exhibited cavitation. Children with hypoplastic enamel defects but no carious component to the lesion were not included in this study. Children with cleft lip or palate also were excluded. A total of 134 children with carious incisors and 90 caries-free children made up the study sample.

Dentists participating in the study were provided with a packet containing a cover letter describing their activities, a notebook with blank data sheets, and exact wording for questions. Wording for each question used in this study was the same as for questions used in the previous study in Morgantown, West Virginia.⁴ Dentists returned the notebooks as soon as their respective interviews were completed. The first author analyzed all data. Pedodontists in the two private practice sites performed dental examinations and designated which children were to be interviewed; interviews were conducted by a dental auxiliary. The interview was done by one of the two second-year pediatric dentistry residents at the Cleveland site. Residents performed the dental examination.

Parents of consecutive children presenting for dental care and fulfilling the dental criteria were interviewed. The interviewer read all questions and choices of responses to the parent; all questions had an objective format so that no interpretation was necessary by the interviewer (responses were recorded on a data sheet). Details of the interviews at the West Virginia site have been described.⁴ The chi-square test was used for statistical analysis.²⁰ Levels of significance of $p < 0.05$ and $p < 0.01$ were used. The study was conducted at four sites. The sites and practice/clinic descriptions were as follows:

1. **Suburban Baton Rouge, Louisiana.** The metropolitan area of 375,000 does not have fluoridated drinking water. The solo practitioner is a Board-certified pedodontist in practice for 15 years at the time of the study. The practice is characterized as middle and upper middle class with mostly self-pay or private insurance-pay patients; Medicaid patients are accepted. Twenty-eight children with incisor caries and 20 caries-free children were studied.
2. **Suburban Akron, Ohio.** The metropolitan area of 300,000 has fluoridated drinking water. The solo practitioner is a Board-eligible pedodontist in practice for six years at the time of this study. The practice clientele was similar to that in Baton Rouge. Thirty children

with incisor caries and 20 caries-free children were studied.

3. **Teaching Hospital, Cleveland, Ohio.** The metropolitan area of 1.5 million has fluoridated drinking water. The clinic site in Rainbow Babies and Childrens Hospital has a pediatric dentistry residency program affiliated with Case Western Reserve University. Candidates completing the program receive a certificate in pedodontics and are Board eligible. The pedodontic residency program had been in this hospital for 12 years at the time of the study. The clinic is characterized as receiving lower and lower middle-class patients with some University-affiliated patients presenting. Medicaid patients predominate. Two second-year residents participated in the study. Thirty children with carious incisors and 30 caries-free children were studied.
4. **Teaching Medical Center, Morgantown, West Virginia.** The metropolitan area of 50,000 has fluoridated drinking water, but well water supplying persons in surrounding Appalachia rarely has measurable levels of fluoride.²¹ The clinic site is at West Virginia University School of Dentistry. Subjects for the study passed through a central screening point for the programs and faculty practice. Data for the reference study at this site have been reported.⁴ Forty-six children with carious incisors and 20 caries-free children were studied.

Results

Demographic data are shown in Table 1. No differences or trends were found between caries-free children and those with carious incisors for age of the child or age of the mother. No significant differences were found in sex distribution; the ratio in the carious incisor group was 66 female:69 male, and in the caries-free group, 46 female:44 male. The average number of children per family was almost identical for caries-free and carious incisor children in all four study sites.

Mothers and fathers of caries-free children were more likely to have attended college than counterparts of children with carious incisors (this was true at all study sites). The difference was statistically significant (for mothers $\chi^2 = 13.1$, $p < 0.01$; for fathers, $\chi^2 = 31.6$, $p < 0.01$). For the Cleveland site, a high percentage of mothers were single and no analysis of fathers' education was done.

Marital status of the mother did not differ significantly when considering the four sites collectively ($\chi^2 = 0.0009$, n.s.). However, a significant difference was found at the Akron site for marital status. Mothers of caries-free children were more likely to be married than mothers of children with carious incisors ($\chi = 9.6$, $p < 0.01$). This was the only instance in the study where the two suburban sites differed significantly. Other differences between the Akron and Baton Rouge study sites were slight and

Table 1. Summary of Data For Caries-Free Children and Children With Carious Incisors

	Caries-Free				Carious Incisors			
	Baton Rouge	Akron	Cleveland	Morgantown	Baton Rouge	Akron	Cleveland	Morgantown
Demographic Data								
Ages (Mean in Years)								
Mother	30.7	29.5	25.7	29	27.7	27.3	24.3	26
Child	2.3	2.5	2.7	2.9	2.2	2.4	2.6	2.8
Mother Married (%)	90	100	23	95	86	57	45	87
Attended College (%)								
Mother	65	55	17	70	32	20	10	24
Father	70	70	—	80	43	13	—	22
Number of Children Per Family (Mean)	1.8	1.9	1.8	1.9	1.7	2.1	1.8	1.8
Child Frequently Supervised By Another Adult (%)	85	75	67	25	46	50	50	45
Dental Information As Reported by Mother								
Age First Saw Cavities (Mean in Months)	20	22.8	21.8	22	—	—	—	—
Predicted Longevity Of Mother's Own Dentition Beyond Age 65 (%)	90	90	90	70	54	50	73	38
Supplemental Fluorides (%)	65	70	0	—	32	29	0	—

in no instance was a trend reversed. No overall significant difference was found between caries-free children and those with carious incisors regarding supervision by someone other than a parent ($\chi^2 = 2.14$, n.s.). At three of the sites, caries-free children were supervised more frequently by another person than were the children with carious incisors.

Dental data reported by parents are presented in the lower portion of Table 1. The mean age when cavities were first noticed by the parent was almost identical for the four study sites. Data on use of additional fluorides (except toothpaste) were available from three of the sites. At the Cleveland site, no parent in either group reported use of additional fluoride. At the two suburban sites, parents of caries-free children were more likely to provide additional fluoride than parents of children with carious incisors ($\chi^2 = 9.0$; $p < 0.01$). Mothers of caries-free children at all four study sites were more optimistic than mothers of children with carious incisors about keeping their own teeth beyond age 65 ($\chi^2 = 19.8$; $p < 0.01$). The trend was similar at three of the four study sites; however, at the Cleveland site more than 66 per cent of mothers from both groups were optimistic about maintaining their own dentition beyond age 65.

Data on nursing are presented in Figures 1 and 2. Parents of children with carious incisors were more likely to have been aware of the potential cariogenicity of liquid in the bottle before noticing the carious lesions ($\chi^2 = 43.5$; $p < 0.01$, Figure 1). The percentages were

similar for respective groups at all four study sites. Seventy-eight per cent of parents of children with carious incisors at the four study sites had attempted to substitute water in the nursing bottle; a lower percentage of parents of caries-free children (56%) attempted to substitute water in the bottle. However, of those who attempted substitution, parents of caries-free children were more often successful in getting the child to accept the water substitute ($\chi^2 = 16.6$, $p < 0.01$, Figure 2).

Frequencies of incisor surface involvement for children with carious incisors showed a trend for multiple surfaces to be involved per child. Incisal surfaces were involved least frequently (51% of children) with facial surfaces next

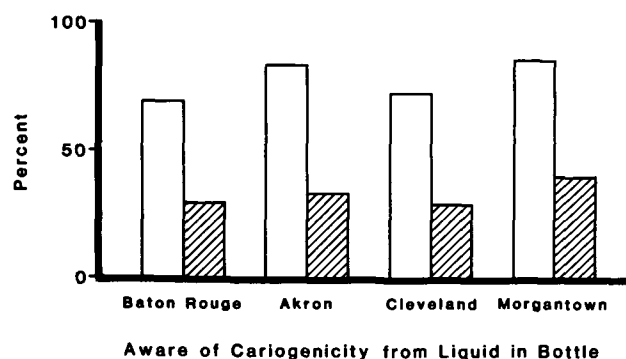


Figure 1. Percentages of parents interviewed who were aware before noticing the cavities that if the child slept with the bottle it might cause cavities of the upper incisor teeth (unlined bars, caries-free group; lined bars, group with carious incisors).

(75%). In comparing the frequency of children with involved incisal and facial surfaces, incisal surfaces are involved less often ($\chi^2 = 16.1$; $p < 0.01$).

Discussion

Nursing caries appears to cut across practice settings and geographic boundaries in several respects at least for children presenting for care. Therefore, it is important to note data indicating similarities (as listed above) as well as differences.

A definitive profile of the child with nursing caries remains elusive — a single profile probably does not exist. It may be useful to first say what nursing caries is not; it is not necessarily a disease associated with children from young mothers, of large families, or of single parent homes (except for the Akron example for the last point). The possible role of a grandparent or babysitter contributing to nursing caries is unresolved by this study. If surrogates are contributory, it would appear that the quality of the time with the child is more critical than whether someone else supervises the child.

Previous awareness of excessive bottle feeding hazards by parents is evident in two categories of data. First, approximately one-third of children with nursing caries have parents who frankly admit such awareness. (This is probably a minimum that is inherent in this format, requesting information implying guilt.) Perhaps equally important is the fact that more than three-fourths of parents of children with carious incisors substituted water in the bottle; it seems logical that the reason for substitution would be either suspected or known potential harm. These data reinforce the notion that many parents know the potential consequences of excessive nursing and that simply informing them of hazards is not enough. The fact that about one-third of parents of nursing caries children provide additional fluorides is further evidence that parents are attempting to reduce dental disease.

Overindulgence or lack of parental control has been implied in nursing caries. One point in this study may be useful in assessing this association. Refusal of water

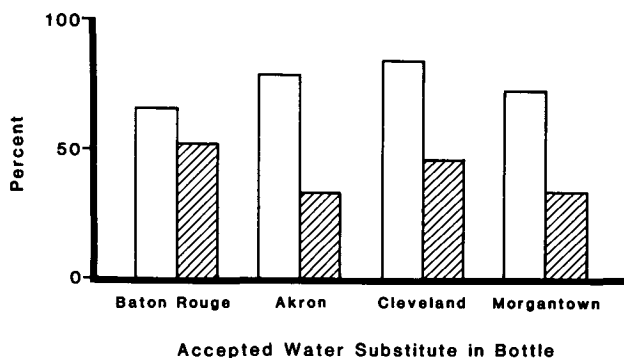


Figure 2. Percentages of parents who were successful in getting the child to accept water as a substitute in the nursing bottle. Percentages are based on the numbers of parents who attempted to substitute water in the nursing bottle (unlined bars, caries-free group; lined bars, group with carious incisors).

as a substitute by children with carious incisors probably indicates a lack of persistence by the parent. The need for taste satisfaction has been suggested; the act of nursing alone is not enough.

Demographics and socioeconomic factors for children with nursing caries differ from children having large lesions of approximal surfaces of molars.^{4,22} Children with nursing caries tend to come from small families (mean of about two) as opposed to children with approximal lesions of molars (who tend to come from larger families, mean of about three).²² Comparison of data in this study with that of the referenced study indicates a significant difference ($\chi^2 = 9.0$, $p < 0.01$). In other comparisons with data from the same study,²² lower educational level and parental pessimism about maintaining their own dentition were more prevalent in children with large molar lesions than in children with incisor caries ($\chi^2 = 5.36$, $p < 0.05$ for educational level; $\chi^2 = 6.3$, $p < 0.05$ for pessimism about own dentition). These findings reinforce the notion that a specific caries pattern must be compared with specific lifestyle variables before planned intervention is likely to succeed.

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Aaron, The Conductor

Dr. Ronald B. Mack