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Relationships Between Caregivers' Responses to Oral Health Screening Questions and Early Childhood Caries

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Abstract

Objective—This study evaluated relationships between caregiver responses to oral health screening questions and caries in young children.

Methods—Two samples of caregivers answered identical 8-item screening questionnaires about their oral health. One sample included children enrolled in the WIC program who were 24- to 42-months of age; the other sample included 3- to 5-year-old children attending a pediatric dental clinic. Using chi-square and relative risk, questionnaire findings were related to children's caries history based on clinical caries exams.

Results—Questions significantly ($p < 0.05$) related to children's caries in the older sample included caregivers' poorer rating of their oral health, less frequent dental visits, current or recent caries and history of tooth loss due to caries. However, only questions pertaining to tooth loss were related to caries in the younger sample.

Conclusion—Caregivers' reported loss of teeth due to caries was significantly associated with caries development in their children in both samples and may be a useful means for early identification of children at high risk.

Keywords

dental caries; early childhood caries; risk factors

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Introduction

Despite being a very preventable condition, dental caries is one of the most prevalent childhood diseases in the world. Early childhood caries (ECC) is a specific form of severe dental caries that affects infants and young children (1). While some groups (2) have recommended that a child's first dental need not take place until age 3, due to the rapid progression of early childhood caries, age 3 is often too late for primary preventive therapy. Unfortunately, our ability to detect and predict caries in young children is poor as current methods of identifying children at a very young age who are at risk for significant caries development are inaccurate, and difficult to administer. Some examples are diet assessments, plaque indices, *S. Mutans* levels and tooth-brushing habits (3,4). While these factors have proven to have a correlation with childhood caries, they can be difficult to assess and collectively do not adequately assess caries risk (5–7).

Prevention of dental decay and ECC in particular is better for the patient, cheaper for the system, and one of the main goals of the dental profession. Prevention of this disease would be aided by an effective set of predictors that could identify at risk groups and individuals. Several recent studies showing a correlation between mothers' caries experience and her children's caries experience (3, 4;6–8) suggest that some assessment of mother's (or other caregiver's) oral health characteristics may be useful. While these studies relied mostly on clinically-based assessments, less involved means of screening mothers or other caregivers might be more practical. One possible screening method would be the use of questions that would be simple, easy to collect, and enhance caries risk assessments. The purpose of this study was to assess how caregivers' responses to a short series of oral health screening questions were related to their children's caries experience in two different age groups of children.

Methods

This study utilized two distinct samples of young children to assess the strength of relationships between responses to a brief 8-item questionnaire concerning caregivers' oral health and caries occurrence in their children. The first sample included children and caregivers (usually mothers) taking part in an 18-month longitudinal study with children recruited into the study at 6- to 24-months of age, while the second sample included children and caregivers taking part in a cross-sectional study of caries in 3- to 5-year-old children. Both samples were recruited following the guidelines and approval of the University of Iowa Institutional Review Board. The study samples are described separately, below.

In the first study, mothers (or other caregivers) with children 6 to 24 months of age were recruited from an Iowa WIC-based caries study (9). Examinations for caries were conducted on children at baseline (n=212), 9 months (n=164) and 18 months (n=128). Data concerning caregivers' oral health were collected by mail at the study's approximate mid-point among those still participating (n=176) and related to caries at the 18-month follow-up examination when study participants were 24 to 42 months old. Of 176 questionnaires mailed, 100 were returned. The final sample included those responding to the questionnaire and completing the third study exam (n=87).

In the second study, 104 caregivers with children aged 3- to 5-years of age attending a pediatric dental clinic serving low-income families were recruited. This study was a cross-sectional study, with the questionnaire given to the caregivers to complete during the study visit, with all caregivers completing the questionnaire. Findings from the questionnaire were related to caries findings at the lone, concurrent study visit.

For both studies, caries exams were conducted by one trained examiner using d1, d2-3 criteria that distinguished between frank, cavitated lesions and non-cavitated ones (10). Exams were conducted with a halogen head lamp in the knee-to-knee position for children in the first study, and using a standard dental chair for the second study. An explorer was used to assess potential cavitated lesions. For both studies, data were also collected regarding beverage consumption, *S. mutans* levels, plaque levels and demographic factors.

The questionnaire was identical for both study samples and included 8 multiple choice items related to caregivers' dental history and beliefs (See Tables 1 & 2). Relationships between questionnaire items and presence of one or more cavitated carious lesions were assessed using bivariate analytic techniques, specifically, chi-square tests, assessment of relative risk as well as specificity and sensitivity for selected questionnaire items.

Results

The first sample included 49 males and 38 females with a mean age of 30.7 months at the last dental examination. The second sample included 43 males and 61 females, with the mean age of 46.9 months. Both samples were drawn from low-income families with 59% of those in the first sample and 50% of those in the second sample having annual family incomes of \$20,000 or less. In the younger sample, 14 children (16%) had d-2 or filled decay, while in the older sample, 50 children (48%) had d-2 or filled decay.

Table 1 presents the results of the relationships between caregivers' questionnaire responses and subsequent caries experience for the younger study sample, while Table 2 presents the results for the relationships between caregivers' questionnaire responses and concurrent caries experience in the older study sample. As seen in Tables 1 & 2, while several questionnaire items were associated with caries in the second sample of older children, only the two variables (Questions #7 & 8) associated with caregivers' previous tooth loss were associated with caries in the younger (first) sample.

Specificity and Sensitivity values for the question concerning the loss of 2 or more teeth (Question #8) were 86% and 43%, respectively, for the younger sample, and 78% and 52%, respectively, for the older sample. Values obtained for the question regarding cavities and tooth loss (Question #7) were somewhat less consistent, with specificity and sensitivity of 81% and 54% for the younger sample, and 61% for both measures in the older sample.

Discussion

The results of this study suggest that several caregivers' responses to the screening questions may be associated with early childhood caries, particularly in the older sample. However, given that ideally, caries risk should be identified early, the significant responses to

screening questions in the younger sample may be the most useful in identifying those children at high risk for caries at an early age. In the younger sample, responses related to caregivers' loss of a tooth (or teeth) due to caries were the only factors significantly associated with caries development in their young children, and these responses were also related to caries in the older sample.

There are several possible reasons why caregivers' loss of teeth may be related to caries in their children. It is plausible that there may be common biological factors (such as *S. mutans* carriage which was associated with caries in both samples) between caregivers tooth loss and children's caries; however, it's likely that caregivers' history of tooth loss due to caries may reflect other more difficult to measure factors. These factors may include: current and past poverty such that caregivers may not have been able to afford alternative dental treatment; lower value placed on teeth and oral health; lower value placed on oral hygiene for both caregiver and child; and relatively poor dietary choices (e.g., sugar-added beverages) for both caregivers and their young children.

For the older sample, the study found that other questions were also associated with caries including lower caregiver ratings of their oral health, less frequent visits to the dentists and self-reported presence of "cavities". These items may also reflect some biological relationships, but again, likely may reflect economic or health behavior issues.

Perhaps more importantly, these questions may be simple cost effective adjuncts to current health history questionnaires to identify young children at high risk for dental caries. In particular, questions relating to caregivers' tooth loss were associated with caries, such that children who had caregivers with tooth loss had significantly greater caries prevalence than those with no tooth loss in both samples (Tables 1 & 2). Given the challenges in identifying children at risk for caries in early childhood, and the cost and access issues involved in providing treatment for very young children, posing such questions to parents may help to more easily identify those children at highest risk. In both samples, specificity was relatively high for the questions related to tooth loss suggesting that in such high-risk populations, caregiver loss of teeth is highly indicative of caries in the corresponding children. Sensitivity was more modest, so that some cases may be missed by focusing solely on these questions; hence the need to consider additional risk indicators.

The samples in this study were both from low-income populations which suggests that among these economically "high risk" children, these questions may help to further identify those at higher risk for developing caries. However, the samples differed in that the older sample was drawn from a clinic setting where children were more likely to be seeking treatment for caries so that they may not be completely comparable. Nonetheless, the information gained by asking these questions may help to target preventive protocols to prevent the need for costly treatment. In addition, such questions could be used not only by dental professionals, but pediatricians, nurses, WIC staff, community health workers and others, as well to identify those at increased risk and make appropriate referrals prior to caries occurring or early in the disease process.

While the study suggests the utility of certain parent-directed questions in identifying young children at high risk for caries, there were limitations including relatively small samples from a single geographic region, and some dissimilarity in the samples (described previously). In addition, in the younger sample, there was a significant loss to follow-up which may have biased results and reduced statistical power to detect relationships. Thus, follow-up studies with larger samples, high response rates and a range of geographic locations are needed to assess whether self-reported parent oral health factors are truly useful in caries risk assessment.

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Table 1

Relationship between mothers' questionnaire response and child caries experience for 24- to 42-month olds (study sample 1)

Question	n	Caries Prevalence (%)	p-value	Relative Risk of frank decay (d2 or filled) (95% CI)
1. How would you describe the condition of your teeth? Good to Excellent Fair to Poor	58 29	16 17	0.84	1.1 (0.4,3.0)
2. Which statement best describes when you go to the dentist? I go regularly I don't go regularly	31 56	10 20	0.23	2.0 (0.6,6.7)
3. How often do you usually go to the dentist? At least once per year Less than once per year	44 42	14 19	0.50	1.4 (0.5,3.7)
4. How long ago was your last dental visit? Within the last year More than one year ago	44 43	11 21	0.23	1.8 (0.7,5.1)
5. When was the last time you had treatment for a cavity? Within the past two years More than two years ago	34 51	12 16	0.61	1.3 (0.4,4.1)
6. Which best describes the cavities that you have now? I don't believe that I have cavities or a dentist has told me I don't have any cavities. I think I have cavities, or a dentist has told me that I have one or more cavities	45 42	13 19	0.47	1.3 (0.5,3.8)
7. Which of the following best describes your cavity history? I've never had a cavity, or have had cavities but never had a tooth pulled I've had cavities and have had a tooth pulled	65 21	9 33	<0.01	3.6 (1.4,9.6)
8. Are you missing two or more teeth due to cavities? Yes No	16 71	38 11	0.01	3.3 (1.3,8.3)

Table 2

Relationship between mothers' questionnaire response and child caries experience for 3- to 5-year-olds (study sample 2)

Question	n	Caries Prevalence (%)	p-value	Relative Risk of frank decay (d2 or filled) (95% CI)
1. How would you describe the condition of your teeth? Good to Excellent Fair to Poor	51 53	29 66	<0.01	2.2 (1.4,3.9)
2. Which statement best describes when you go to the dentist? I go regularly I don't go regularly	34 65	32 57	0.02	1.8 (1.0*,3.0)
3. How often do you usually go to the dentist? At least once per year Less than once per year	41 57	34 60	0.01	1.7 (1.1,2.8)
4. How long ago was your last dental visit? Within the last year More than one year ago	59 38	42 55	0.22	1.3 (0.9,2.0)
5. When was the last time you had treatment for a cavity? Within the past two years More than two years ago	57 41	53 44	0.39	1.2 (0.8,1.8)
6. Which best describes the cavities that you have now? I don't believe that I have cavities or a dentist has told me I don't have any cavities. I think I have cavities, or a dentist has told me that I have one or more cavities	49 50	29 68	<0.01	2.4 (1.5,3.9)
7. Which of the following best describes your cavity history? I've never had a cavity, or have had cavities but never had a tooth pulled I've had cavities and have had a tooth pulled	52 51	37 59	0.02	1.6 (1.1,2.5)
8. Are you missing two or more teeth due to cavities? Yes No	38 66	68 36	<0.01	1.9 (1.3,2.8)

* 1.036 rounded to 1.0