BRIEF COMMUNICATIONS

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

Christopher R. Roberts, DDS; John J. Warren, DDS, MS; Karin Weber-Gasparoni, DDS, PhD

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 eight-item screening questionnaires about their oral health. One sample included children enrolled in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) 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 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.

Key Words: dental caries, early childhood caries, risk factors

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, because of 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, Streptococcus mutans levels, and toothbrushing 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 - 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 atrisk 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 the 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 eight-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 crosssectional 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 as follows.

In the first study, mothers (or other caregivers) with children 6 to 24 months of age were recruited from a caries study based at an Iowa Special Supplemental Nutrition

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Send correspondence and reprint requests to Professor John Warren, N-337 Dental Science Building, The University of Iowa, Iowa City, IA 52242-1010. Tel.: (319) 335-7205; Fax: 319-335-7187; e-mail: john-warren@uiowa.edu. Christopher R. Roberts is with the Department of Pediatric Dentistry at the Ohio State University. John J. Warren is with the Department of Preventive & Community Dentistry, University of Iowa. Karin Weber-Gasparoni is with the Department of Pediatric Dentistry, University of Iowa. Manuscript received: 6/4/08; accepted for publication: 2/2/09. A preliminary version of a portion of this research was presented at the 85th general session of the International Association for Dental Research, March 23, 2007.

Program for Women, Infants and Children (WIC) clinic (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 midpoint among those still participating (n=176) and related to caries at the 18-month follow-up examination when the study participants were 24 to 42 months old. Of the 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 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 kneeto-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 eight multiple choice items related to caregivers' dental history and beliefs (see Tables 1 and 2). Relationships between questionnaire items and presence of one or more cavitated carious lesions were assessed using bivariate analytic techniques, specifically chi-square tests and 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 a 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

Table 1 Relationship Between Mothers' Questionnaire Response and Child Caries Experience for 24- to 42-Month Olds (Study Sample 1)

Question	п	Caries prevalence (%)	<i>P</i> -value	Relative risk of frank decay (d2 or filled) (95% CI)
1. How would you describe the condition of your teeth?				
Good to excellent	58	16		
Fair to poor	29	17	0.84	1.1 (0.4,3.0)
2. Which statement best describes when you go to the dentist?				
I go regularly	31	10		
I don't go regularly	56	20	0.23	2.0 (0.6,6.7)
3. How often do you usually go to the dentist?				
At least once per year	44	14		
Less than once per year	42	19	0.50	1.4 (0.5,3.7)
4. How long ago was your last dental visit?				
Within the last year	44	11		
More than one year ago	43	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	34	12		
More than two years ago	51	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.	45	13		
I think I have cavities, or a dentist has told me that I have one or more	42	19		
cavities			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	65	9	< 0.01	3.6 (1.4,9.6)
I've had cavities and have had a tooth pulled	21	33		
8. Are you missing two or more teeth due to cavities?				
Yes	16	38		
No	71	11	0.01	3.3 (1.3,8.3)

Table 2Relationship Between Mothers' Questionnaire Response and Child Caries Experience for 3- to5-Year-Olds (Study Sample 2)

Question	11	Caries prevalence	<i>P</i> -value	Relative risk of frank decay (d2 or filled) (95% CI)
		(70)		
1. How would you describe the condition of your teeth?				
Good to excellent	51	29		
Fair to poor	53	66	< 0.01	2.2 (1.4,3.9)
2. Which statement best describes when you go to the dentist?				
I go regularly	34	32		
I don't go regularly	65	57	0.02	1.8 (1.0*,3.0)
3. How often do you usually go to the dentist?				
At least once per year	41	34		
Less than once per year	57	60	0.01	1.7 (1.1,2.8)
4. How long ago was your last dental visit?				
Within the last year	59	42		
More than one year ago	38	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	57	53		
More than two years ago	41	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 a cavities.	any 49	29		
I think I have cavities, or a dentist has told me that I have one or more	cavities 50	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 pulle	d 52	37		
I've had cavities and have had a tooth pulled	51	59	0.02	1.6 (1.1.2.5)
8. Are you missing two or more teeth due to cavities?	-			
Yes	38	68		
No	66	36	< 0.01	1.9 (1.3,2.8)

* 1.036 rounded to 1.0.

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 and 2, while several questionnaire items were associated with caries in the second sample of older children, only the two variables (Questions #7 and 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 two 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 is 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., sugaradded 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, may likely reflect economic or health behavior issues.

Perhaps more importantly, these questions may be simple costeffective 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 and 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 the 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 suggest 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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