



Knowledge of male and female midwestern college students about baby bottle tooth decay

Henrietta L. Logan, PhD Robert S. Baron, PhD Michael Kanellis, DDS
Michael Brennan, DDS Bethany A. Brunsman, PhD

Abstract

The purpose of this bellwether study was to establish the level of knowledge a group of young men and women college students had about baby bottle tooth decay (BBTD) and the associated risk factors. The results show that knowledge about BBTD is very limited even among a well-educated group of young adults. Overall 39% of the respondents had heard of BBTD whereas 87% had heard of sudden infant death syndrome (SIDS). Thirty-two percent thought BBTD was a fictional (vs. "real" or "unsure") health problem, while 3% of the respondents thought SIDS was a fictional health problem. Knowledge about overall risk factors for oral disease was greater than that for BBTD. Further, these subjects report that if they believed that adopting a certain feeding practice would reduce the risk of tooth decay for their babies, they would be likely to adopt it. Men and women significantly differed on the age at which a child should first see a dentist ($\chi^2 = 19.56$, $df = 5$, $P < 0.01$). Forty-five percent of the men selected either when the first tooth erupts or between 6–18 months as the time a child should first be seen by a dentist. Only 11% of the women thought a child should be seen that early. Forty-five percent of the women students selected 2–3 years as the earliest age at which a child should be seen by a dentist. Implications of this research are discussed. (Pediatr Dent 18:219–23, 1996)

In recent years, the dental community has learned a great deal about baby bottle tooth decay (BBTD).^{*} Knowledge has come in several areas including from research into the epidemiology, cariology, and cultural/behavioral risk factors associated with the disease. Research has established links between patho-

genic microorganisms and BBTD^{1–3} as well as between prolonged bottle feeding with liquids containing fermentable carbohydrates and BBTD.⁴ Prolonged breast feeding also has been implicated as a causative factor.⁵ A variety of cultural and behavioral risk factors also have been associated with the disease.^{7–10} BBTD appears to be a multifactorial condition that develops from a particular interaction of pathogenic bacteria, decreased host resistance, and frequent and prolonged feedings with liquids containing fermentable carbohydrates.

Knowledge of the progression of infant caries suggests that BBTD is a preventable disease.^{11,12} One reasonable way to interrupt the cycle of this oral disease is to alter child feeding patterns, which would require educational efforts.¹³ Educational programs designed to alter feeding patterns usually emphasize the harm resulting from habits such as putting a baby to bed with a bottle of liquid containing fermentable carbohydrates, but even intensive educational programs (focusing on both the individual and the community) have had limited success.¹⁴ Very few educational programs targeting BBTD have been evaluated, and no studies have involved a control group.¹⁵

Some parents of children with BBTD have acknowledged that they had prior knowledge of the risk factors associated with this condition.^{11,16,17} It is not clear how much knowledge these parents actually had, nor whether these parents actually believed the information they had received, or whether they were convinced that their baby would be at risk for BBTD.¹⁵ Furthermore, there are no studies that report how much the general public knows about BBTD. Thus, comparisons about whether these parents knew more or less than the average person are not possible. Without the comparison data, it is not likely we can know whether it is the absence of information that causes some groups to be more vulnerable or whether other factors, not yet identified, are in operation.

Has the dental profession been successful in transmitting knowledge about BBTD to the public and, in

* Multiple names for this condition have appeared in the literature including nursing caries and infant caries. For convenience, we will use the term baby bottle tooth decay (BBTD) to include both the oral disease resulting from nursing bottle and breast feeding.

TABLE 1. PERCENT OF RESPONDENTS BY GENDER AND ACROSS GROUPS WHO HAD HEARD OF SELECTED REAL AND FICTIONAL HEALTH

| | % Male (N = 47) | % Female (N = 53) | % Total (N = 100) | Chi Square | P- Value |
|---------------------------------|--------------------|----------------------|----------------------|---------------|-------------|
| <i>Real</i> | | | | | |
| Dental caries | 38 | 32 | 35 | 0.19 | NS |
| Baby bottle tooth decay | 36 | 42 | 39 | 0.30 | NS |
| Sudden infant death syndrome | 79 | 94 | 87 | 4.08 | 0.043 |
| <i>Fictional</i> | | | | | |
| Myopic miasma | 38 | 15 | 26 | 5.82 | 0.016 |
| Pediculosis | 38 | 21 | 29 | 3.72 | 0.054 |
| Pediatric senile | 32 | 9 | 20 | 6.53 | 0.011 |
| Baby bad mouth | 30 | 15 | 22 | 2.33 | NS |

particular, to young adults of child-bearing age who are not yet parents? This is an important question because most parents do not take their infant to the dentist before the age of weaning and much of the tooth damage may have occurred before a dental team can intervene. One way to test this question is to ask a well-educated group of young adults who have no direct link to the dental community about key issues surrounding BBTD. By using such a group, a missing link in the BBTD research—a bellwether knowledge and attitude study—would be available from which other important comparisons could be made. Thus, the purpose of this study was to establish the level of knowledge a group of young men and women had about BBTD and associated risk factors.

Methods and materials

One hundred psychology undergraduate students volunteered to participate in this study. After informed consent, a questionnaire was administered en masse to this convenience sample. All questionnaires were usable. Data from the questionnaire were entered into a computer and the accuracy of the data was verified. Data were analyzed using descriptive statistics.

Research questionnaire development

The questions were developed jointly by the authors and pilot tested with five subjects similar to the research sample. The wording of the items was refined and clarified based on the pilot testing. This questionnaire assessed selected demographics and the following:

1. Knowledge of BBTD as an actual health problem compared to other real and fictional health problems
2. Understanding of causes of childhood tooth decay
3. Likely strategies to calm a fussy baby
4. Knowledge of the risks of common feeding practices.

Section 1 listed seven real or fictional childhood health problems and asked respondents to place a check mark if they had not heard of the condition before. They were also asked to circle whether they believed the problem to be real, fictional or if they were unsure. These health problems included three real health problems and four fictional problems (Table 1).

Section 2 asked subjects to select likely causes of tooth decay in children by circling yes or no following a statement (Table 2).

Section 3 listed nine strategies to calm a fussy baby and asked the subjects to rate how likely the strategy would be to work. The continuous scales were anchored with "not likely" and "very likely" (Table 3).

Section 4 asked respondents to rate on a continuum from "beneficial" to "dangerous" nine common child care practices (Table 4). The final two items in this section asked whether putting a baby to bed with a bottle could cause a health problem and whether the respondents planned to put their infants to bed with a bottle. Scores from sections 3 and 4 ranged from 0 to 73. Demographic data were gathered along with information about how and when the respondents planned to clean their baby's teeth.

Results

Subjects

The mean age of the subjects in this study was 19 years. Forty-seven men and 53 women participated in this project as part of a requirement in a general edu-

TABLE 2. PERCENT OF RESPONDENTS BY GENDER AND ACROSS GROUPS WHO ENDORSED CERTAIN BEHAVIORS AS CAUSES OF CHILDHOOD TOOTH DECAY

| Behaviors | % Male (N = 47) | % Female (N = 53) | % Total (N = 100) | Chi Square | P- Value |
|---|--------------------|----------------------|----------------------|---------------|-------------|
| 1. Frequent exposure to sweetened liquids | 96 | 98 | 97 | 0.01 | NS |
| 2. Too many sweets in the diet | 89 | 98 | 94 | 2.01 | NS |
| 3. Putting a baby to bed with a bottle of fruit juice | 55 | 72 | 64 | 2.90 | 0.089 |
| 4. Bottle feeding for too long and too often | 45 | 53 | 49 | 0.66 | NS |
| 5. On demand/constant breast feeding | 13 | 17 | 15 | 0.10 | NS |
| 6. Beginning to brush a child's teeth too early | 19 | 11 | 15 | 0.66 | NS |
| 7. Excessive teething | 21 | 10 | 15 | 1.78 | NS |
| 8. Too much meat | 13 | 4 | 8 | 1.65 | NS |

TABLE 3. MEAN RATINGS BY GENDER AND ACROSS GROUPS OF RESPONDENTS' WILLINGNESS TO USE CERTAIN STRATEGIES TO CALM A FUSSY BABY ON A SCALE FROM 0 TO 73

| Quieting Strategy | Male (N = 47) | Female (N = 53) | Total (N = 100) | Chi Square | P- Value |
|--|------------------|--------------------|--------------------|---------------|-------------|
| 1. Establish a nighttime routine | 55.07 | 56.42 | 55.78 | 0.25 | NS |
| 2. Play soft music | 53.33 | 55.99 | 54.74 | 1.20 | NS |
| 3. Allow the child to have a favorite toy | 47.92 | 53.67 | 50.97 | 2.92 | 0.091 |
| 4. Give the child a pacifier | 46.67 | 46.54 | 46.60 | 0.00 | NS |
| 5. Hold the child until he/she goes to sleep | 44.77 | 46.74 | 45.81 | 0.39 | NS |
| 6. Give the child a drink of water | 35.91 | 45.11 | 40.79 | 6.30 | 0.014 |
| 7. Give the child a bottle filled with milk or juice | 42.33 | 38.44 | 40.26 | 1.14 | NS |
| 8. Let the child sleep in your bed with you | 35.91 | 38.37 | 37.21 | 0.41 | NS |
| 9. Leave the child alone until he/she goes to sleep | 32.31 | 38.78 | 35.74 | 3.30 | 0.072 |

Note: Higher scores indicate greater willingness to use the strategy.

TABLE 4. MEAN RATINGS BY GENDER AND ACROSS GROUPS OF THE RISKS OF COMMON FEEDING PRACTICES ON A SCALE FROM 0 TO 73

| Parental Practices | Male (N = 47) | Female (N = 53) | Total (N = 100) | F | P- Value |
|---|------------------|--------------------|--------------------|------|-------------|
| 1. Putting a baby to bed with a bottle of fruit juice | 49.19 | 53.65 | 51.55 | 2.92 | 0.090 |
| 2. Allowing a baby to suck his/her thumb | 44.06 | 48.46 | 46.39 | 2.31 | NS |
| 3. Putting a baby to bed with a bottle of milk/formula | 45.21 | 45.30 | 45.26 | 0.00 | NS |
| 4. Putting a baby to bed with a bottle of water | 43.33 | 36.19 | 39.54 | 6.18 | 0.015 |
| 5. Letting a baby use a pacifier | 31.27 | 38.12 | 34.90 | 4.73 | 0.032 |
| 6. Use of fluoridated water for a child | 25.98 | 29.73 | 27.97 | 1.10 | NS |
| 7. Excessive teething | 49.35 | 42.10 | 45.50 | 9.60 | 0.003 |
| 8. Do you plan to put your baby to bed with a bottle | 31.28 | 31.84 | 31.60 | 0.03 | NS |
| 9. Can putting a baby to bed with a bottle cause a health problem | 37.42 | 43.43 | 40.50 | 5.82 | 0.02 |

Note: Higher ratings indicate higher perceived health risk.

cation psychology course at the University of Iowa. Twenty-one percent of the men and 85% of the women had moderate to extensive experience with children under 4 years of age. Less than 5% of the respondents had children of their own.

Questionnaire

Men and women students significantly differed on the age at which a child should first see a dentist (chi sq = 19.56, df = 5, $P < 0.01$). Forty-five percent of the men selected either when the first tooth erupts or be-

tween 6–18 months as the time a child should first be seen by a dentist. Only 11% of the women thought a child should be seen that early. Forty-five percent of the women students selected 2–3 years as the earliest age at which a child should be seen by a dentist. There were no differences between men and women on their knowledge about the age at which a child should be weaned or when the first tooth erupts. On a scale of 0–73 with 0 as not sure and 73 very sure, men and women did not differ on whether proper care of baby teeth can prevent cavities. The average score for both men and women was 44 (mid-point score = 37). Similarly when asked to mark a scale of 0–73 as to how important baby teeth are for a child's health and well being, men and women did not significantly differ. The mean score for the combined groups was 50.

Results showed that overall 39% of respondents had heard of BBTD whereas 87% had heard of SIDS (Table 1). Thirty-two percent thought BBTD was a fictional (vs. "real" or "unsure") health problem, while 3% of the respondents thought SIDS was a fictional health problem. Men and women significantly differed on knowledge of SIDS but not on BBTD and dental caries. Men were less aware of SIDS than were women. Men were significantly more likely to think that "myopic miasma" and "pediatric senile" were real health problems than were women.

Ninety-seven percent of the respondents thought frequent exposure to sweetened liquids could cause tooth decay, while only 15% thought prolonged breast feeding could cause tooth decay (Table 2).

The same amount (15%) thought that brushing a child's teeth too early and excessive teething could result in tooth decay. Men and women students did not differ significantly on any of the items related to causes of childhood tooth decay.

When asked which of the nine strategies for calming a fussy baby would be likely to work, subjects tended to rank all of them slightly past halfway toward very likely to use (Table 3). They scored holding a baby as more likely to work than giving a bottle to the child, and giving a bottle was considered no more useful than

leaving the child alone. Table 3 also shows that men and women did not significantly differ in their willingness to use these strategies, except for giving a baby a drink of water. Women rated themselves significantly more willing to use that strategy to calm a baby than were men.

A rank of practices (ranked dangerous to beneficial) showed that putting a baby to bed with a bottle of fruit juice was considered more dangerous than putting a baby to bed with a bottle of milk/formula (Table 4). The most beneficial health practice as reported by these subjects was the use of fluoridated water for the child. Subjects gave a mean score of 13.3 of 73 points (low scores = not at all likely) on how likely it would be for them to clean their child's teeth after the child had gone to bed. On the other hand, when asked how likely it would be for the respondent to clean a child's teeth after the child had gone to bed if they believed it would prevent tooth decay from developing, the mean response was 49 of 73 points. The mean score on whether these subjects planned to put their baby to bed with a bottle was 31.6 of 73 (low = no). Finally, the mean score for whether putting a baby to bed with a bottle would cause health problems was 40.5 of 73. Men and women significantly differed on their perception of health risks for putting a baby to bed with a bottle of water, use of pacifier, and excessive teething. Men rated giving a baby a bottle of water as significantly more risky than did women. On the other hand, women rated pacifier use significantly more risky than did men. Excessive teething was rated more risky by men than by women although the overall rating was among the lowest.

Discussion

Dentists often assume that the parents of their young patients have adequate knowledge about infant oral health problems. This study calls that assumption into question. Over half of this relatively well-educated group of young adults of child-bearing age had not heard of dental caries or BBTB but had heard of SIDS. Table 1 shows that recognition of two real dental diseases (dental caries and baby bottle tooth decay) was scarcely greater than for two completely fictional health problems. Women were somewhat more aware of the difference between fictional and nonfictional disease than were men.

The potential danger to oral health of prolonged breast feeding was not part of the general knowledge for this group of subjects. In fact, that on-demand breast feeding was rated as nearly equal to beginning brushing too early for both men and women students as a risk factor was surprising. Women had no greater knowledge of which behaviors cause childhood tooth decay than did men. One conclusion from these items is that the discrepancy between what the dental profession accepts as common knowledge and what this sample of well-educated members of the public knows is greater than first thought.

The concern raised by the failure to recognize dental caries as a real disease is lessened somewhat by the overall awareness of general risk factors for oral disease. For instance, this group of subjects was aware of the dangers of excessive sweets and of the benefits of fluoridated water to oral health. The two most widely accepted risk factors for tooth decay were frequent exposure to sweetened liquids and too many sweets in the diet. Respondents also report that putting a baby to bed with juice was the most dangerous of the practices listed. We conclude that education about oral health for some aspects of oral disease has had a positive impact on the public's attitudes, and that this information is likely a part of the general public's awareness. Readers are reminded that this particular educational effort has extended over many years and has taken many forms from dentists' and hygienists' educational efforts to mass media campaigns.

In examining the strategies that these respondents believed likely to calm a fussy baby, giving a bottle of milk or juice was not especially popular. They believed that holding the child or playing soft music would be more helpful. It follows that BBTB may not be a problem for this group and their infants because they may not use a bottle of milk or juice for reasons other than feeding. Thus, this group's lack of awareness of other potential risk factors for BBTB may not be deleterious. On the other hand, if a young parent believed that giving a bottle would calm a child (and they were not aware of BBTB and its risk factors), that child might be in danger of developing caries. Once again, it is probable that the public knows less about BBTB and its risk factors than generally believed by dentists. It follows that in the absence of this crucial knowledge about BBTB, certain specific and common child rearing practices such as putting a baby to bed with juice can produce painful and costly long-term effects.

It was not surprising that these respondents thought it unlikely that a parent or guardian would clean a baby's teeth when the baby was asleep. What was surprising was the extent of the shift in their attitude when the likelihood of dental disease was mentioned. That is, if cleaning a child's teeth after the child was asleep might prevent caries, the likelihood of this group of subjects adopting such behavior increased considerably. Thus, we conclude that one key to decreasing BBTB is to transmit a clear understanding of the benefits of particular behaviors before the parents have a child with the disease.

Finally, the dental profession has been asking how best to educate young parents about BBTB. What follows from this study is that before they have children may be the best time. One method to accomplish this transmission of information is through frequent and long-term public health messages to the general public. The overall awareness of SIDS indicates that public health information about this condition has reached the public. It is possible that the drama of the syn-

drome has also contributed to the greater awareness about SIDS than BBTD. Given however, the suffering and pain produced by BBTD, it stands to reason that specific information about BBTD could similarly increase public awareness.

Limitations

We acknowledge several design limitations in this study. First, because we used a convenience sample of college students, it is not clear how generalizable these findings are to the at-large public. Second, knowing the attitude and information level of this group of young men and women may or may not predict their child feeding and caring practices. Finally, definition of such terms such as beneficial and dangerous were left to the respondents and may make interpreting the responses problematic. Even with these limitations, we believe this study offers useful information about the general level of awareness of BBTD.

Summary

The results of this study show that knowledge about BBTD is very limited even among a well-educated group of young adults. Men and women frequently did not significantly differ on their attitudes and knowledge about BBTD. Knowledge about overall risk factors for oral disease such as sustained use of sweets is greater than that of BBTD. Further, these subjects report that if they believed that adopting a certain practice would reduce the risk of decay for their children, they would be likely to adopt it. Considering this research, the dental community should target the general public to get the message about the potential risk factors for BBTD to young people before they have children. As with other public health campaigns, patience and perseverance will be necessary if we are to accomplish the goal of lessening the prevalence and incidence of BBTD.

Dr. Logan is professor, department of preventive and community dentistry; Dr. Baron is professor, department of psychology; Dr. Kanellis is assistant professor, department of pediatric dentistry; all at the University of Iowa, Iowa City. Dr. Brennan works in the department of preventive and community dentistry and Dr. Brunsman works in the department of psychology.

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