Nutrient intake and dental caries in the primary dentition

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Abstract

An extensive literature has assessed the influence of diet on dental caries, but to date dietary influences on caries of the primary dentition have not been studied widely. This study examined the role of specific nutrients in the caries experience of preschool children. A total of 628 children ages 2 to 6 years received a dental examination, parent interview, and a seven-day diet diary. The diary was completed adequately for 269 children (43%). The average daily intakes of 15 nutrients were computed and compared with recommended dietary allowances (RDA); total sugar consumption and Ca/P ratio were calculated. Each child's gender, age, fluoride history, previous dental experience, and nutrient intakes were examined as independent variables. Stepwise logistic regression showed the combination of categories most predictive of caries was older age, suboptimal fluoride consumption, and recall dental visit. No association was apparent between dental caries and the intake of specific nutrients, total sugar consumption, or Ca/P ratio. (Pediatr Dent 14:314–21, 1992)

Introduction

Diet refers to the customary allowance of food and drink taken by a person from day to day. The diet may affect dental caries by reacting with the enamel surface and by serving as a substrate for cariogenic microorganisms.[1] The dietary component identified as the major contributor to dental caries is refined carbohydrate, and particularly simple sugars such as sucrose. The role of diet in dental caries is complex; nutrients and modifying factors are important in determining to what extent it contributes to dental caries.[2]

One of the earliest studies assessing the effect of sucrose on caries was the Vipeholm study of Gustafsson et al.[3] in 1954. In this study, subjects were exposed deliberately to high concentrations of refined carbohydrate. When ingested between meals, sugar was found to increase caries experience significantly. The time, frequency of ingestion, and the form in which sucrose was ingested were all important. These observations should be interpreted carefully since the study population lived in an institution, was mentally compromised, and had minimal oral hygiene. More recently, using data collected in the National Health and Nutrition Examination Survey I (NHANES I), Ismail[4] investigated associations between high DMFT scores and reported frequency of consumption of foods from eight food groups. He concluded that the strongest discriminator between the low- and high-DMFT groups was the between-meal consumption of table sugars and syrups. Also, the between-meal consumption of sugary desserts was associated significantly with high DMFT scores.[4]

Since scores such as DMFS and DMFT reflect the cumulative nature of dental caries, attempts to correlate dietary information and caries scores are influenced by the age of the subject and the period of time for which teeth have been erupted. Therefore, associations should be more readily apparent in younger individuals in whom there has been little change in dietary patterns over time. Previous studies have not investigated the effect of regularly consumed nutrients on dental caries experience of young children. Also, previous studies have not investigated the relative importance of diet under the modern conditions of prevention, where many children benefit from community water fluoridation, fluoride supplements, fluoride-containing dentifrices, and regular dental visits. The purpose of this study was to assess the relative role of several selected nutrients as indicated by the Recommended Dietary Allowances,[5] sugar, and Ca/P ratio on the dental caries experience of preschool children with primary dentitions.

Materials and Methods

The study received approval from the Human Subjects Committee of the University of Minnesota, and was conducted between 1982 and 1983. Preschool children presenting for routine dental examination to the University of Minnesota Department of Pediatric Dentistry who fulfilled the inclusion criteria were invited to participate.

Criteria for inclusion of the child in the study were:

- Age between 2 and 6 years
- Healthy, defined as freedom from systemic or congenital disease, and without present or past medical history likely to affect their dietary patterns or caries susceptibility
- An intact primary dentition with all primary teeth erupted and present (i.e., N = 20) and without erupted permanent teeth. (The primary dentition could contain teeth with carious lesions and/or restorations, but no pit and fissure sealants)

- The child's cooperation allowed a dental examination
- The parent present at the examination was willing to allow the child to participate. This parent was responsible for the child's daily care and had been throughout the child's life, and was capable of completing the study forms.

The study sample consisted of 628 children (325 boys, 303 girls). Although ethnicity was not a selection criterion, the study sample was primarily Caucasian. A letter of informed consent was obtained for each subject. At the initial examination, the birthday, gender, height, weight, and the child's history of experience of dentistry, assessed as being the first or a recall dental visit, were recorded. Each child's postnatal fluoride exposure (via community water supply at each place of residence since birth, or via tablet supplementation) was recorded as optimal, suboptimal, or unknown. A suboptimal fluoride history was defined as the continuous or intermittent consumption of suboptimally fluoridated water, without fluoride supplementation or with intermittent supplementation, from birth until at least 5 years of age.[6] All information was verified using national and state lists of water supplies[7, 8] and updated by referral to the records of the Minnesota Department of Health and other states.

Dental caries was recorded as dft and dfs scores (since only children with an intact primary dentition were included, the "m" value was zero). All examinations were performed with the child seated in a dental chair, using an overhead dental light (Pelton Crane, Charlotte, NC), explorer (No. 5™, DE HuFriedy Manufacturing Co., Chicago, IL), and mouth mirror. When necessary, as determined by interproximal contacts between the primary molars, two bite-wing radiographs were exposed and examined. All examinations and radiographic interpretations were performed by the same examiner (LBM). Intraexaminer reliability was assessed by duplicate blind examination of a random selection of 15% of dentitions and radiographs and was determined to be 95% (i.e., 95% of all the lesions were scored similarly on both occasions).

A seven-day diet diary[9] was given to the parent by the dietician, along with instructions for completion. The parent returned the diary by mail; nonrespondents were reminded personally by telephone, on at least two occasions, and additional materials made available by mail. Most diaries were returned within one month, but diaries received up to four months after the examination were included in the study. Upon receipt, diaries were checked by the dietician for completion and accuracy. A diary was considered unacceptable and excluded from the study if any of the following criteria were met:

- The child was being breast-fed
- The diary was not kept for all seven days
- The description or amount of any item was unclear
- There was inconsistency in the household measures used, which could not be clarified
- The diary was completed in such a manner that it was impossible to code.

Completed diet diaries were hand coded by the dietician using the 1981 Code Book of the Michigan State University Nutrient Data Base (Department of Food Science and Human Nutrition, MSU, East Lansing, MI), keypunched, transferred to magnetic tape, and examined using the 1981 MSU Nutrient Data Base.

The total (seven days) intake was calculated and divided by seven to compute an average daily intake of the following nutrients: protein, calcium, phosphorus, iron, magnesium, zinc, thiamin, riboflavin, niacin, vitamin A, vitamin B_6, vitamin B_{12}, folacin, vitamin C, and vitamin D. The average daily intake of sugar and the calcium to phosphorus (Ca/P) ratio were computed. Although not computed separately, total sugar consumption consisted of monosaccharides (such as glucose and fructose), and disaccharides (such as sucrose and lactose). The Recommended Dietary Allowances (RDAs) of 1980[5] were used for comparison of nutrient intakes. Individual average daily intakes were used to calculate per cent RDA and to compute group mean consumption. For each nutrient, if the intake was 100% RDA, it was classified as "adequate;" if < 100% RDA, it was considered "inadequate." The value of 100% RDA was selected as the cut-off value, because the RDAs for individual nutrients differ in margins of safety, and interpretation of the meaning of levels of intake at any proportion of the RDA cannot be considered the same for all the nutrients.[10]

Of the total sample (N = 628), 269 subjects (43%) provided codable diaries, hereafter termed the subset. Subjects were divided by age into two groups: 2–3 years (N = 127) and 4–6 years (N = 142). Caries experience, expressed as freedom from, or presence of restorations and/or carious lesions, was the dependent variable. The independent variables were gender, age, fluoride history, history of experience of dentistry, and average daily intake of nutrients as % RDA. Caries experience and nutrient intake were examined using the Chi square statistic (alpha level = 0.01). Since this test does not detect associations between multiple independent variables, a stepwise logistic regression analysis of the contingency tables also was performed using the BMDP statistical package.[11] The Student's *t*-test (two tailed) was used to compare group mean sugar intake and Ca/P ratios of the caries-free (CF) and caries-history (CH) subjects.

Table 1. Distribution of sample characteristics

Variable		Subset Sample			Total Sample		
		Boys	*Girls*	*Total*	*Boys*	*Girls*	*Total*
Sample size	Number	134	135	269	325	303	628
Age (months)	Mean ± SD	50 ± 13	49 ± 12	50 ± 12	49 ± 12	48 ± 12	48 ± 12
	Range	26–72	24–70	24–72	24–71	24–72	24–72
Height (inches)	Mean ± SD	41.8 ± 3.1	40.9 ± 3.4	41.4 ± 3.3	41.7 ± 3.1	40.7 ± 3.3	41.2 ± 3.3
	Range	34.5 – 50.2	34.0 — 48.0	34.0 –50.2	34.0 – 51.0	29.0 – 48.5	29.0 – 51.0
Weight (lbs)	Mean ± SD	39.6 ± 6.3	37.6 ± 6.4	38.6 ± 6.4	39.5 ± 6.4	37.2 ± 6.1	38.3 ± 6.4
	Range	26.0 – 63.0	24.5 – 58.0	24.5 – 63.0	26.0 – 66.0	24.5 – 54.0	24.5 – 66.0
Fluoride history	Optimal	107	112	219 (81.4%)	261	246	507 (80.7%)
	Suboptimal	23	19	42 (15.6%)	54	44	98 (15.6%)
	Unknown	4	4	8 (3.0%)	10	13	23 (3.7%)
Experience dentistry	1st visit	76	72	148 (55%)	184	180	364 (58%)
	Recall	58	63	121 (45%)	141	123	264 (42%)
dft score	Mean ± SD	2.2 ± 3.6	2.2 ± 3.7	2.2 ± 3.7	2.5 ± 3.7	2.3 ± 3.6	2.4 ± 3.7
	Range	0–14	0–20	0–20	0–20	0–20	0–20
dfs score	Mean ± SD	3.7 ± 6.5	3.7 ± 7.5	3.7 ± 7.0	4.1 ± 6.6	3.9 ± 7.1	4.0 ± 6.8
	Range	0–25	0–51	0–51	0–38	0–51	0–51

Results

A comparison of the subset and total samples showed similar distributions for age, height, and body weight (Table 1). In comparison with the total sample (Table 1), the subset contained a slightly higher proportion of children with an optimal fluoride history (81.4 vs. 80.7%) and previous experience of dentistry (45 vs. 42%), and a slightly lower mean dfs score (3.7 vs. 4.0). Because of these similarities, the subset was considered representative of the total sample, and any conclusions reached by analysis of the subset could be extended to all subjects.

In the subset, five subjects showed extreme values (very low or very high) for consumption of some nutrients. These findings were considered due to recording or coding errors and the subjects were deleted, reducing the subset to 264 subjects (160 CF and 104 CH), distributed as follows: dfs (1–5) = 46; (6–10) = 23; (11–15) = 13; (16–20) = 9; (21–51) = 13.

The CH group showed a higher mean sugar consumption (Table 2, page 317) than the CF group (97 vs. 91 g), which was not statistically significant ($P = 0.08$). Mean Ca/P ratio intake of CF and CH (0.78) did not differ (Table 2). Almost all subjects in the subset met or exceeded the RDA for protein (99.6%), phosphorus (84%), thiamin (96%), niacin (91 %), riboflavin (100%), vitamin A (92%), B12 (85%), and C (85%). The mean intakes of these nutrients by CF and CH groups were similar (Table 2), and showed no statistically significant differences (Table 3, page 318). Approximately half of the subjects met or exceeded the RDA for calcium (52%), vitamin B_6 (42%), folacin (57%), and magnesium (50%). The CF and CH groups showed similar mean intake (Table 2) which did not differ with statistical significance for nutrients other than magnesium, which showed a negative association between "adequate" intake and CH (Table 3).

Only a few subjects showed an intake equal to or above the RDA for zinc (10%), vitamin D (11%), and iron (32%). The MSU Nutrient Data Bank does not account for the vitamin D that is added to milk in Minnesota (under state law). Therefore, the data under-represented vitamin D intake and no conclusions can be drawn for this nutrient. The CF children showed similar intake of zinc, but lower mean intake of iron than CH children (Table 2). A positive association between CH and "adequate" intake of iron was found (Table 3). Intakes of iron and magnesium were associated strongly with age. When the subjects were divided by age, the iron and magnesium intakes of the younger children was significantly different from the intakes of the older children ($P < 0.001$ for both trace elements). Since age was associated significantly with CN, the associations of these nutrients with CH were deemed to be spurious.

Table 4 (page 318) compares observed frequencies of CF and CH subjects with respect to gender, age, fluoride history, and history of dental experience. The CF and CH children were distributed similarly by gender. There was a strong positive association between CH and age ($P < 0.001$) and previous experience of dentistry ($P = 0.001$); and a negative association between CH and optimal fluoride history ($P = 0.003$).

These results indicated that preschool children with or without dental caries could not be differentiated based on the "adequacy" of nutrient intake, raising the question whether those with a high caries history could be so differentiated from the CF group. To examine this, the 58 subjects with a dfs 6 were compared with the CF group. Chi-square tests showed no statistically significant difference in total sugar intake ($P = 0.109$), and Ca/P ratio ($P = 0.597$). Intakes exceeding 100% RDA were associated with CF with statistical significance for Ca (Chi-square value with continuity correction, 79.727; $P < 0.001$), vitamin B_6 (60.706; $P < 0.001$), and folacin (29.952; P 0.001). Intakes less than 100% RDA were associated with CF with statistical significance for iron (33.647; $P < 0.001$). Intakes exceeding 100% RDA were associated with high caries experience with statistical significance for P (18.890; $P < 0.001$), thiamin (7.428; $P = 0.006$), and vitamin A (14.249; $P < 0.001$). However, the significant differences for all these nutrients disappeared when the sample of high caries subjects was divided into the two age groups, indicating once again the age-dependent nature of nutrient intakes.

Table 2. Description of nutrient intake

Nutrients (Units)	*Mean ± SD Nutrient Intake*			
	Caries-Free	*Caries -History*	*Subset Sample*	*CSFII 1985–86**
Total sugar (g)	91 ± 25	97 ± 28	93 ± 27	
Ca/P ratio	0.78 ± 0.08	0.78 ± 0.11	0.78 ± 0.09	
	Nutrient Intake as % RDA			
Protein (g)	210 ± 49	204 ± 47	207 ± 48	222
Calcium (mg)	101 28	107 35	103 31	105
Phosphorus (mg)	129 30	134 35	131 32	132
Vitamin C (mg)	207 122	176 111	202 117	186
Thiamin (mg)	153 64	154 53	154 60	153
Niacin (mg NE)	149 62	150 52	150 58	151
Riboflavin (mg)	194 61	200 56	197 59	197
Vitamin B6 (mg)	104 52	100 42	102 48	127
Vitamin B12 (μg)	172 103	204 139	185 119	192
Folacin (μg)	147 100	125 73	138 91	157
Vitamin A (μg RE)	208 102	224 123	214 111	215
Vitamin D (μg)	53 87	60 49	56 42	—
Iron (μg)	85 42	98 37	89 41	88
Magnesium (mg)	108 40	103 59	106 49	121
Zinc (mg)	70 ± 19	76 ± 37	72 ± 27	84

* 1988 Continuing Survey of Food Intakes by Individuals, conducted by the U.S. Department of Agriculture in 1985–1986.[19]

Logistic regression was used to identify the combination of factors most predictive of caries in this population. The aim in this model is to utilize as many independent variables as required to provide a reliable description of *which* variables in the population effect a significant change in the dependent variable, and yet employ as few as necessary to simplify the interpretation of the resultant model.[12] Since stepwise logistic regression requires binomial variables, the eight subjects with unknown fluoride history were dropped, reducing the subset to 256 subjects (155 CF and 101 CH). To test the hypothesis that the variable entered in the model at each step significantly improved the prediction of the dependent variable, the Improvement Chi-square[11] was used (Table 5, page 319). This value is computed from the log of the ratio of the current versus the previous likelihood function values. The introduction of age in the model at step 1 provided a significant improvement over the constant at step 0 (improvement Chi-square = 21.69, $P < 0.001$). Fluoride history also provided a significant improvement (11.07, $P = 0.001$), as did history of experience of dentistry (3.79, $P = 0.051$). The introduction of nutrient intakes as additional variables in the model did not provide further significant improvement in prediction.

To test the hypothesis that the model at each step fit the data adequately, the C. C. Brown goodness-of-fit test was used.[11] Since 37.5% of the cells showed frequencies of five or less, goodness-of-fit Chi-square values were deemed unreliable to assess the fit of the model.[13] The C.C. Brown test compares the fit of the data to the logistic model; a small P-value indicates that the logistic model is not appropriate for the data. Table 5 shows that the logistic model is adequate for the data, since all P-values are large and nonsignificant.

Table 3. Nutrient intake of caries-free and caries-history subjects

Nutrients	Observed Frequencies				Chi^2	P value
	Caries-Free		Caries -History			
	<100% RDA	100% RDA	<100% RDA	100% RDA		
Protein	1	159	0	104	0.652	0.419 (n.s.)
Calcium	79	81	48	56	0.262	0.609 (n.s.)
Phosphorus	26	134	15	89	0.160	0.689 (n.s.)
Vitamin C	27	133	112	92	0.426	0.232 (n.s.)
Thiamin	6	154	5	99	0.177	0.674 (n.s.)
Niacin	16	144	7	97	0.847	0.357 (n.s.)
Riboflavin	0	160	0	104	•	
Vitamin B_6	93	67	60	44	0.005	0.944 (n.s.)
Vitamin B_{12}	25	135	14	90	0.234	0.628 (n.s.)
Folacin	65	95	49	55	1.082	0.298 (n.s.)
Vitamin A	13	147	8	96	0.160	0.899 (n.s.)
Vitamin D	144	16	91	13	0.403	0.526 (n.s.)
Iron	118	42	62	42	5.805	0.016 (sig.)
Magnesium	72	88	60	44	4.062	0.044 (sig.)
Zinc	146	14	92	12	0.552	0.457 (n.s.)

• No statistics computed.

All possible combinations of categories of the variables selected to enter the model then were examined to determine which combination best explained the dependent variable. Table 6 (page 319) shows the predicted log odds ratios for caries, given particular values for the different combinations of independent variables. The combination of categories most strongly associated with caries (last line of Table 6) was older age, suboptimal fluoride consumption, and recall visit, showing the highest value for predicted log odds (1.341).

Discussion

The fact that the study population was receiving care at a university dental clinic may be considered to bias the subject pool. Parents may have selected this setting for several reasons. Since fees are usually lower than in private practice, it is possible that parents chose the clinic for financial reasons, and studies have shown that oral health and dietary habits are influenced by socioeconomic level.[14,15] However, the University of Minnesota Pediatric Dentistry Clinic provides service to a broad spectrum of the population of the Minneapolis-St. Paul area. Based on other studies conducted simultaneously with our study, it cannot be assumed that the clinic services were being sought mostly by those at the lower levels of the social or economic strata.[16]

A nonresponse rate of 57% was observed in the return of diet diaries, raising concern about the representativeness of the data. In addressing this concern, several characteristics of the total sample were compared with the responding subset. The two samples

Table 4. Characteristics of caries-free and caries history subjects

Variable		Observed Frequencies		Chi^2	P value
		Caries-Free	Caries History		
Gender	Male	81	51	0.063	0.801 (n.s.)
	Female	79	53		
Age (yr)	2–3	93	31	23.292	0.000 (sig.)
	4–6	67	73		
Fluoride history	Optimal	140	75	11.752	0.003 (sig.)
	Suboptimal	15	26		
Unknown	5	3			
Experience dentistry	1st visit	101	45	10.053	0.001 (sig.)
	Recall	59	59		

were found to be similar with respect to mean age, height, and body weight; fluoride history, dental experience, and dental caries, allowing the subset to be considered representative of the total sample. National surveys also show similar nonresponse rates; for example, 60% of the basic group failed to respond in the 1985 Continuing Survey of Food Intake by Individuals.[17] Studies employing diet diaries impose heavy demands on participants, and a high nonresponse rate can be anticipated.

Table 5. Summary of stepwise logistic regression

Step	Variable Entered	Log Likelihood	Improvement		Goodness of Fit	
			Chi^2	P value	C.C. Brown	P value
0		-171.71	—	—	0.000	1.000
1	Age	-160.86	21.69	0.000	0.000	1.000
2	Fluoride history	-155.33	11.07	0.001	2.409	0.300
3	Experience dentistry	-153.43	3.79	0.051	0.811	0.667

All children participating in this study consumed so-called "normal" American diets — i.e., there were no vegetarian, macrobiotic, or religion-dictated diets. These diets were not specifically excluded by the investigators; they were simply not apparent in the sample. Possible biases in data generated from diet diaries of children must be recognized. One bias associated with parental diary keeping is the possibility that parents could change the child's diet during the recording period, either to simplify the task or because as a result of record keeping they were made more aware of their child's diet.[18] Also, children may eat certain foods, especially snacks, without their parents' knowledge (more likely for older children), in which case those foods may be unreported.

The most recent, nationally representative food consumption survey is the 1988 Continuing Survey of Food Intakes by Individuals (CSFII), conducted by the U.S. Department of Agriculture in 1985–1986.[19] Comparison of mean intakes of nutrients as per cent RDA for the CSFII children and the subset (Table 2) shows similar values for all nutrients, suggesting that the diets of children in the present study reflect those typical of American children.

Of particular interest, the intake of total sugar was not observed to be associated with CH. Other investigators have similarly failed to demonstrate a clear association.[20, 21] However, it should be pointed out that the present study did not examine either the form or the frequency of consumption of refined carbohydrate and the cariogenicity of these attributes of sugar consumption[3, 4, 22] continues unchallenged by the present data. The frequency of sugar consumption by subjects in the present study will form the basis of a later publication.

Except for a positive association with iron, and a negative association with magnesium, caries was not observed to be associated with the intake of any specific nutrient. Subsequent statistical analysis indicated that these associations were the result of a significantly lower intake of iron and higher intake of magnesium by the younger age group of children. Younger children typically consume a diet dominated by dairy products, which are a poor source of iron and the major dietary source of magnesium in the U.S.[10] These findings agree with those of other reports.[19]

A Ca/P ratio of 1:1 or 2:1 is considered desirable.[1] Variations in human dietary Ca/P ratio (particularly low P content) have been associated with cariogenicity.[23]

Table 6. Stepwise logistic regression cells

Age	Fluoride History	Experience Dentistry	Caries-Free	Caries History	*Observed Proportion with Caries	†Predicted Proportion with Caries	Predict Log Odds
2–3	optimal	1st visit	60	12	0.167	0.178	-1.529
2–3	optimal	recall	23	7	0.233	0.272	-0.984
2–3	suboptimal	1st visit	4	6	0.600	0.416	-0.340
2–3	suboptimal	recall	3	4	0.571	0.551	0.205
4–6	optimal	1st visit	29	21	0.420	0.403	-0.394
4–6	optimal	recall	28	35	0.556	0.538	0.151
4–6	suboptimal	1st visit	5	5	0.500	0.689	0.795
4–6	suboptimal	recall	3	11	0.786	0.792	1.341

* Observed proportion of children with caries. † Proportion of children predicted by logistic regression to have caries.

More recently, Rugg-Gunn et al.[24] could find no significant difference in the caries scores of children with high or low dietary Ca/P ratios. In the present study, the range of Ca/P ratios (0.41–1.08) was similar to that reported by Rugg-Gunn et al. and much narrower than that recorded by Stanton,[23] but CF and CH groups did not differ in mean Ca/P ratios. The absence of subjects with very low Ca/P ratios makes it impossible to assess the influence of such ratios on caries.

Some investigators indicate that girls' teeth erupt slightly earlier than boys.[25] This could influence caries experience, since for children of the same age, girls would have their teeth exposed to the oral environment for a longer period. The present study found no significant difference between the caries experience of preschool boys and girls, supporting the conclusions of others,[26] and the 1971–1974 NHANES report, where the number of carious lesions in the U.S. population did not differ by gender.[27]

The age variable has considerable impact on caries experience, since the dentition has little of the healing and regenerating capacities of other body organs. In addition, the dfs score is a cumulative measure of caries attack over time. The limited number of surveys of preschool children in the U.S. demonstrate that caries experience increases with age. In a survey of 915 children between 18 and 39 months of age, Hennon et al.[28] showed 8.3% of the 18- to 23-month-olds had dental caries, increasing to 57.2% by 36 to 39 months. In the present study, the strongest positive association observed was between caries and age, and the strongest negative association was with optimal fluoride consumption, continuing to support the well-substantiated cariostatic benefit of fluoride.[29]

A significant positive association between history of experience of dentistry and caries was found in the present study. Freeman et al.[30] assessed the relationship between the dmf scores and demographic and behavioral variables among multiracial preschool children. They found that children who visit the dentist more often had a greater number of teeth restored, and reasoned that parents of children with carious lesions would seek professional care more often than those of children with sound teeth. The present study supports this conclusion. It seems likely that parents of children with caries or experiencing discomfort are more prone to seek dental care, since very young CF children are not likely to go to the dentist. In 1986, 62.9% of American children between the ages of 2 and 4 years, and 7.7% of those between 5 and 17 years, had never seen a dentist.[31] Although the American Academy of Pediatric Dentistry recommends early parent counseling and dental/oral examination for all infants prior to 12 months of age,[32] in 1982 half (49.4%) of the children surveyed between 5 and 10 years of age had not visited a dentist before the age of 5 years.[33]

The ability to identify high risk groups of children via the prediction of dental caries is an important public dental health issue. To date, attempts at predictive models have focused on school-aged children,[34] and employed a wide range of variables such as DMFS and scores for predicted caries, sealants, morphology, white spot lesions, fluorosis, sound permanent teeth, plaque, *S. mutans* and lactobacilli.[35] It is of particular interest that the logistic regression model generated in the present study of preschool-aged children was able to closely predict the proportion with caries in comparison with the observed proportion (0.792 vs. 0.786) based on age, fluoride history, and previous dental experience. The inclusion of dietary variables (specific nutrient intakes) did not improve the predictability. As others have demonstrated,[36] previous experience of caries continues to be a major factor in future dental caries experience. It should be pointed out that the present predictive model applies to a preschool child population, and cannot necessarily be applied to individual children.

Conclusions

1. Assuming the diet diary was representative of their usual diets, most of the children were obtaining intakes of protein, phosphorus, thiamin, niacin, riboflavin, and vitamins A, B_{12}, and C equal to or above the RDA from the foods they consumed, but intakes of calcium, vitamin B_6 folacin, iron, magnesium, and zinc were below the RDA.
2. The mean nutrient intakes for the subset were close to those reported in previous national surveys, suggesting that the diets of the children in this study were representative of the diets of American children.
3. The caries experience of the preschool children studied could not be explained by the differences in the intake of individual nutrients, including total sugar consumption. A logistic regression model demonstrated that caries experience was best predicted based on age, fluoride history, and history of dental experience.

This investigation was supported by The Sugar Association and General Mills Foundation. The authors acknowledge the skillful assistance of Marilyn Johnson as the dietician, and the statistical expertise of Dr. Joel Rudney.

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