Dental Caries Experience and Factors among Preschoolers in Southeastern Mexico: A Brief Communication

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Abstract

Objective: *To examine the association between dental caries prevalence and selected variables in preschool children.* ***Methods:*** *A cross-sectional study was carried out with 1,303 preschoolers (ages 3-6 years old), and the mothers completed questionnaires. The children were examined by one of three standardized dental examiners. Logistic regression was performed to identify associations between dental caries and other factors.* ***Results:*** *Mean dmft was 1.54+2.47, with 44.1% of children having dmft>0. Caries prevalence was associated with older children (OR=1.39); medium (OR=1.66) and low (OR=2.41) socioeconomic levels; mediocre (OR=1.71) and inadequate (OR=2.25) hygiene; negative attitude toward oral health (OR=1.51); and the presence of enamel defects (OR= 1.74).* ***Conclusion:*** *Both overall caries prevalence and dmft index were relatively low. The results of this study substantiate previous reports in the international literature for clinical, behavior, socio-demographic, and socio-economic variables that contribute to dental caries in Mexican children.*

Key Words: Dental caries, epidemiology, primary teeth, dmft index, Mexico

Introduction

Dental caries is a public health problem and the most common cause of tooth loss in preschool and schoolchildren. It is a process involving an imbalance in the interactions between the tooth surface/subsurface and the adjacent microbial biofilm leading to deterioration of dental tissues (1). Attempts have been made to identify those individuals affected by increased dental caries experience through a wide variety of demographic, socioeconomic, dietary, physical, chemical, and microbiological factors. In the past 20 to 30 years, comparisons of existing epidemiological data noted a decline in the prevalence of dental caries, mainly among children and adolescents in industrialized countries (2). In Mexico, a moderate-income country, the dental caries problem has been documented mainly through descriptive studies. The objective of the present study was to examine the strength of the association between dental caries prevalence and selected variables in preschool children.

Materials and Methods

This study's design and execution met the ethical review indications and guidelines for the protection of research subjects established by the Universidad Autonoma de Campeche and the Instituto Mexicano del Seguro Social.

Design and study population. A cross-sectional study was conducted on all children enrolled during the 1997-1998 school year (total enrolled = 1,580) in the ten Campeche City public preschools, which were included in a preventive dentistry program managed by a federally funded, third-party medical insurance system (Instituto Mexicano del Seguro Social, or IMSS). (IMSS is the largest medical insurance system in the country, available to non-government employees.) The preventive dentistry program includes the periodic administration (twice a year) of topical fluoride (2% sodium fluoride gel administered for 4 minutes, after cleaning with manual tooth brush) and a verbal, one-on-one review of tooth brushing routine. Children younger than 3 or older than 6 years of age and children whose parents did not sign the informed consent were excluded. The final sample was 1,303 children.

Variables collected. The dependent variable was dmft; the Significant Caries index (SiC) was also calculated. The independent variables were sex, age, oral hygiene, presence of enamel defects, socioeconomic status (SES), and the importance that the mother or caregiver ascribed to the oral health of her child (attitude). SES

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was assigned to each child as per the information derived from the questionnaire according to the father's occupation and mother's highest level of formal education. These variables were combined using polychoric principal component analysis (3). The socioeconomic level was divided in high, medium, and low terciles.

The mother's attitude was summarized as positive (score 1) if answered "yes" to both of the following questions: Do you consider important that your child keeps his/her primary teeth in good condition? and Have you ever examined his/her teeth to ascertain if they are healthy? or negative attitude (score 0) if answered "no" to either of the two questions (4, 5). Oral hygiene was determined by measuring dental plaque, using the modified index of Sillness and Löe (absent when less than 20% of the tooth surfaces had plaque, and present when more than 20% had plaque), and by asking the mothers to self-report toothbrushing frequency. These two variables were used to construct the clinical-behavioral scoring system for oral hygiene in children, previously used in other studies (6, 7).

Standardized questionnaires were distributed in the schools for the mothers to complete, and were collected in the same way. Four examiners were trained and standardized (Kappa values, 0.89 to 0.93) to measure clinical variables. Exams were conducted in a dental chair using a dental mirror, explorer, and natural light. The d component included caries in dentin as well as recurrent caries. The m component included only teeth missing due to caries. No radiographs were used and no white spot lesions were recorded.

Statistical analysis. For continuous variables, measures of central tendency and dispersion were calculated. For categorical variables, the frequencies and percentages for each category were obtained. A multivariate binary logistic regression model was created and the results are presented as odds ratios (OR) with 95% confidence intervals (95% CI). Variables from the bivariate analysis that had a p-value <0.25 were included. Various tests and steps recommended were undertaken while building the regression model (carried out the variance inflation factor test, the specification error test, the Box-Tidwell test for continuous variables, and assessed interactions) (8). Confidence intervals were calculated with standard error adjusted for clustering on school. The statistical package STATA 8.2® was used for all the statistical procedures.

Results

The questionnaire response rate was 82.5%. Of the 1,303 children included in the study, 51.7% were male, with an average age of 4.3 ± 0.8 years. The mothers averaged 11.1 ± 3.9 years of schooling. The majority of mothers (65.8%) ascribed positive importance to the preservation of teeth for their children. Based on the questionnaire administered to the mothers, 71.5% of the children brushed their teeth daily (at least once per day). With regard to the clinical oral examination, 9.6% of the children had enamel defects and 58.0% had dental plaque. Table 1 shows the descriptive results of caries across key variables. The caries prevalence (dmft>0) was 44.1% (caries-free children = 55.9%), with mean dmft and dft 1.54 ± 2.47 and 1.53 ± 2.43, respectively. The overall SiC index was 4.31.

Table 2 shows the crude odds ratios (OR) and adjusted OR (AOR) for caries experience, including confidence intervals (95% CI). The frequency of caries in males (44.4%) and females (43.8%) was not different (p>0.05). The odds of having caries was higher among children 5-6 years of age, of medium and low SES, whose mothers had a negative attitude about the importance of oral health of their children, and with mediocre or inadequate oral hygiene (p<0.05). A trend suggesting a difference between children with enamel defects and children without them (p = 0.08) was observed. In the multivariate logistic regression model (Table 2), the vari-

TABLE 1
Distribution of decay, missing and filling teeth index and significant caries index

	dmft; mean±sd	dt; mean±sd	% caries free	SiC index
Age				
3 (n=187)	0.70±1.65	0.67±1.61	73.8	2.11
4 (n=528)	1.50±2.38	1.37±2.19	55.3	4.16
5 (n=514)	1.90±2.69	1.68±2.53	48.6	4.94
6 (n=74)	1.53±2.74	1.30±2.43	64.8	4.48
	p value<0.001*		p value<0.001†	
Sex				
Boys	1.57±2.44	1.42±2.27	55.6	4.35
Girls	1.51±2.51	1.35±2.33	56.2	4.23
	p value>0.05‡		p value>0.05¶	
Socio-economic level				
High	0.88±1.85	2.08±2.66	70.2	2.65
Medium	1.44±2.39	1.33±2.24	56.5	4.01
Low	2.22±2.80	0.66±1.53	42.5	5.46
	p value<0.001*		p value<0.001†	
Oral hygiene				
Adequate	0.96±1.86	0.82±1.70	44.0	2.88
Mediocre	1.62±2.42	1.44±2.26	52.6	4.36
Inadequate	2.35±3.19	2.22±2.94	67.9	6.00
	p value<0.001*		p value<0.001†	
Total	1.54±2.47	1.39±2.30	55.9	4.31

*Kruskalll-Wallis test
†non-parametric test for trend
‡Mann-Whitney test
¶Chi^2 test.

TABLE 2

Results of bivariate and multivariate logistic regression analysis between independent variables and caries experience (dmft=0 vs. dmft>0) as dependent variable (n=1,303)

Variable	OR crude	AOR (95% CI) *	p value
Age			
3 and 4 year olds	1*	1†	
5 and 6 year olds	1.47 (1.18 – 1.82)	1.39 (1.16 – 1.66)	0.000
Socio-economic status			
High	1*	1†	
Medium	1.82 (1.48 – 2.22)	1.66 (1.37 – 2.01)	0.000
Low	3.18 (2.15 – 4.72)	2.41 (1.68 – 3.46)	0.000
Oral hygiene			
Adequate	1*	1†	
Mediocre	1.90 (1.39 – 2.61)	1.71 (1.24 – 2.34)	0.001
Inadequate	2.69 (1.64 – 4.42)	2.25 (1.34 – 3.76)	0.002
Enamel defects			
Absent	1*	1†	
Present	1.58 (0.95 – 2.62)	1.74 (1.05 – 2.89)	0.032
Attitude toward oral health			
Positive	1*	1†	
Negative	1.74 (1.27 – 2.39)	1.51 (1.20 – 1.90)	0.000

* Adjusted odds ratio by variables in the table.

† Reference category.

95% Confidence Interval were calculated with standard error adjusted for clustering on school.

Pearson goodness of fit test x^2 (59) = 47.12; p=0.8676.

Specification error test (linktest): predictor p=0.000, predictor^2 p=0.218.

ables that had been significant at the bivariate analysis level remained significant. Briefly, 5-6 year old children had higher odds of having caries (OR=1.39) than 3-4 year old children. A higher likelihood of having caries in the medium and low SES groups (OR=1.66, OR=2.41, respectively) than among children in the high SES group was observed. Children with mediocre and inadequate oral hygiene had higher odds of having caries (OR=1.71, OR=2.25, respectively) when compared to children with adequate oral hygiene. The mother's negative attitude toward the oral health of her child increased 51% the possibility of having dmft>0. Finally, children with enamel defects had higher odds of having caries (OR=1.74) than children without enamel defects.

Discussion

The caries experience in this study (dmft=1.63) at the ages of 5 and 6 years old was lower than figures reported for other populations in Latin America, but also similar to previous reports (6, 9, 10), keeping in mind that the d component made up the largest percentage (90%) of the index. The children from this study population met the WHO/FID goal (50% or less caries prevalence) for the year 2000. The prevalence figures in this study are lower compared to other reports from Mexico (10, 11), perhaps because this population benefited from the preventive dentistry program, and because the State of Campeche has been included in the country-wide fluoridated domestic salt program since the early 1990s.

The authors found a positive relationship between dental caries and SES, as has been observed in oral epidemiologic investigations in both industrialized and less-developed countries (including existing reports for Mexican populations). Also, the importance that the mother ascribed to the oral health of her children was associated with the child having caries, as well as age, and oral hygiene. (6, 9, 10, 11).

This study had certain limitations that emphasize a cautious interpretation of results. A cross-sectional study measures cause and effect at the same point in time, introducing the problem of temporal ambiguity and the inability to establish causal relationships. The fact that these children benefit from a program of preventive dentistry makes them different from other children, and therefore the results cannot be extrapolated to the general population. Additionally, the use of questionnaires could be introducing some degree of recall bias.

The results of this study substantiate previous reports in the international literature supporting clinical, behavior, socio-demographic, and socio-economic variables as contributing factors for dental caries in children.

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Previous Presentations

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