

Frequency of Tooth Brushing and Associated Factors in Mexican Schoolchildren Six to Nine Years of Age

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ABSTRACT

Objective: To determine the prevalence of daily tooth brushing and evaluate some variables associated.

Subjects and Methods: A cross-sectional study was carried out in 320 schoolchildren six to nine years old in Campeche, Mexico. Information on sociodemographic and socio-economic variables, oral hygiene practices and attitudes were collected through a questionnaire. The frequency of tooth brushing was categorized as "0" = fewer than seven times/week, "1" = at least once a day. In the analysis, nonparametric tests were used.

Results: Mean age was 6.99 ± 1.00 years, 52.5% were boys. The prevalence of daily tooth brushing was 81.6%. In bivariate analysis, the prevalence of tooth brushing was higher ($p < 0.05$) among the children of mothers with higher schooling (9.80 years vs 8.47 years, $p < 0.05$), and in younger children (84.6% in 6–7-year olds vs 71.2% in 8–9-year olds, $p < 0.05$). A slight, non-significant association ($p < 0.10$) was noted between the current frequency of tooth brushing and an earlier age when the child first started brushing with toothpaste. There were no statistically significant differences ($p > 0.05$) in the frequency of tooth brushing by gender or by the mother's attitude toward the oral health of her child.

Conclusions: The prevalence of daily tooth brushing was high compared to other studies. Mother's maximum level of schooling (as an indicator of socio-economic position) was associated with higher frequency of tooth brushing. Maternal characteristics are associated with the oral health behaviour of their children.

Keywords: Mexico, oral health, oral hygiene, schoolchildren, tooth brushing

Frecuencia del Cepillado Dental y Factores Asociados en Escolares Mexicanos de Seis a Nueve Años de Edad

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RESUMEN

Objetivo: Determinar la prevalencia del cepillado dental diario y evaluar algunas de las variables asociadas.

Sujetos y métodos: Se llevó a cabo un estudio transversal en 320 escolares de seis a nueve años de edad en Campeche, México. La información sobre las variables sociodemográficas y socio-económicas, las prácticas higiénicas orales y las actitudes, fue recopilada mediante un cuestionario. La frecuencia de cepillado dental fue clasificada con las siguientes categorías: "0" = menos de siete veces por semana, "1" = por lo menos una vez al día. En el análisis, se usaron pruebas no paramétricas.

Resultados: La edad promedio fue 6.99 ± 1.00 años, 52.5% fueron varones. La prevalencia del cepillado dental diario fue 81.6%. En el análisis bivalente, la prevalencia del cepillado dental fue más alta ($p < 0.05$) entre los niños de madres con mayor escolaridad (9.80 años frente a 8.47 años, $p < 0.05$), y en los

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niños de menor edad (84.6% en los de 6 a 7 años frente a 71.2% en los de 8 a 9 años, $p < 0.05$). Una ligera asociación no significativa ($p < 0.10$) fue observada entre la frecuencia actual del cepillado dental, y la existente en una edad más temprana, cuando el niño comenzara por primera vez a cepillarse con crema dental. No hubo ninguna diferencia estadísticamente significativa ($p > 0.05$) en la frecuencia del cepillado dental por género o por la actitud de la madre hacia la salud oral de su niño.

Conclusiones: La prevalencia del cepillado dental diario fue alta en comparación con la de otros estudios. El máximo nivel escolar de las madres predominio (como indicador de posición socio-económica) estuvo asociado con una mayor frecuencia del cepillado dental. Las características maternas se encuentran asociadas con la conducta en la relación con la salud oral de sus hijos.

Palabras claves: México, salud oral, higiene oral, escolares, cepillado dental

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INTRODUCTION

Among the goals of the International Dental Federation (FDI), the World Health Organization (WHO), and the International Association for Dental Research (IADR) are the decrease of the most prevalent oral diseases and the capacity to keep the natural teeth for as long as possible (1). However, dental caries and chronic periodontal diseases and their sequelae are still important oral diseases in Latin America and the Caribbean, including Mexico (2–6). With considerable unmet treatment needs, they are oral public health problems.

Dental caries is a transmissible infectious disease in which a cariogenic biofilm that is more pathological than protective leads to demineralization of dental hard tissues (7). Periodontal diseases are a group of chronic conditions that cause inflammation affecting the tissues supporting the teeth; they share common clinical manifestations. These diseases are associated with specific pathogenic bacteria that colonize the subgingival area (8, 9). A common feature between dental caries and periodontal disease is that both are caused by (or at least closely associated with) the presence of a dental biofilm and ensuing complex ecological disturbances (10, 11). Tooth brushing is an effective component of at-home self-care to mechanically remove plaque (dental biofilm). Tooth brushing is one consistent component of the educational messages given to children, adolescents and adults in programmes to promote oral health (12, 13). It is commonly branded as the most important factor in preventing caries and periodontal disease. These facts are based on the results of several studies in which oral hygiene practices, such as brushing teeth, were shown to be effective in preventing oral diseases or improving conditions, and even having an effect greater than dietary modifications (12–18).

The prevalence of tooth brushing once, twice, or three times daily has been reported as a variable in relation to age group and geographical region (12, 13, 19–21). Several socio-economic, demographic and behavioural variables have been found associated with this practice (12, 13, 21) and tooth brushing fluctuations across such variables have been identified. In order to develop innovative, relevant and acceptable models of preventive interventions, it remains paramount to

find what the current tooth brushing patterns are, together with key non-clinical variables; if oral health programmes are built upon general assumptions and generic content, their likelihood of having a meaningful impact is greatly diminished. The planning of such programmes should ideally be based on models developed from information previously collected (22). The objective of the present study was to determine the prevalence of tooth brushing in a well-characterized research population, and to evaluate key variables that may modify adherence.

SUBJECTS AND METHODS

The study adhered to the ethical regulations in place at the Autonomous University of Campeche. Permission to conduct the study was obtained from the school authorities and from the head teachers/principals of the schools involved. The mothers of the children were contacted and informed in a letter about the design and work plan; if they accepted to take part in the study, a letter of informed consent was produced. Signed informed consent to examine the children and to obtain the questionnaire information was collected from the parents of the children prior to the oral health examination.

We performed a cross-sectional study that collected several oral health indicators in the city of Campeche, Mexico. The methods related to fluorosis (23) and dental caries (24) data collections have been previously published. This is a school population covered by a preventive dental health programme. For the sampling approach, we first randomly selected three from a total of 30 public schools. On average, the schools had 73–81 schoolchildren ages six to nine years ($n = 2250$). The study group included all children in first to third grades. After applying inclusion criteria (children ages six to nine (to one day before tenth birthday), both genders who were enrolled in a selected school, and whose mothers/guardians had signed the informed consent letter) and exclusion criteria (children outside the age range, who refused to be examined clinically, had a disease or developmental defect affecting the mouth, or who had fixed orthodontic appliances), we ended with a sample of 320 children.

The dependent variable was the frequency of weekly tooth brushing. This was constructed through self-report from

the mother/guardian of the child: how many times the child brushed his/her teeth (with toothpaste) on any given week. Subsequently, the frequency was dichotomized for analysis as 0 = fewer than seven times per week, 1 = at least once a day. Virtually all toothpaste brands in Mexico have fluoride, along the lines of adult toothpaste dosing.

Independent variables (demographic, socio-economic and behavioural) were collected using a structured questionnaire for the mothers, which was delivered and collected through the schools. For this analysis, the variables were age, gender, if the child had dental care in the year preceding the study, mother's maximum level of formal education, and a culturally appropriate assessment of how positive the mother's attitude was toward the oral health of the child [validated and standardized in other studies] (14, 15, 25–27).

Exploratory analysis was performed to describe the sample and evaluate information. In the univariate analyses, we used measures of central tendency and dispersion for continuous variables; for categorical variables, we used frequencies for each category as well as its corresponding percentages. Bivariate analysis was performed using χ^2 and Mann-Whitney tests. Statistical significance was taken as $p < 0.05$. The statistical package used was Stata 9.0®.

RESULTS

A total of 320 schoolchildren were included in the study. Table 1 shows descriptive characteristics of the study sample; mean age was 6.99 ± 1.00 years, 52.5% were male. The average number of years for mothers' schooling was 9.56 ± 4.55 years. According to mothers' self-report, 28.8% of children began brushing and using toothpaste before age two years. The mother's attitude toward the oral health of the child was scored as positive in 61.6% of the cases. Prevalence of tooth brushing (at least one time daily) was 81.6%.

Table 1: Characteristics of schoolchildren 6 to 9 years of age included in the study

Variables	Mean \pm SD	Min–Max
Mother's maximum level of schooling (years)	9.56 \pm 4.55	0–22
Age	n	Percentage
6–7 years	247	77.2
8–9 years	73	22.8
Sex		
Girls	152	47.5
Boys	168	52.5
Started brushing with toothpaste		
After 2 nd birthday	231	72.2
Before 2 nd birthday	89	28.8
Mother's attitude toward oral health of child		
Negative	123	38.4
Positive	197	61.6

The bivariate analysis is shown in Table 2. The mother's maximum level of schooling was higher (9.80 vs 8.47 , $p < 0.05$) among those children who brushed their teeth daily than among those who did not. In the Chi-square test, we observed that younger subjects brushed their teeth more frequently (84.6% vs 71.2% , $p < 0.05$) than older ones. On the other hand, no statistically significant differences ($p > 0.05$) were identified in tooth brushing frequency between boys and girls, nor between children of mothers who had positive or negative attitudes toward the oral health of their child. Finally, we noted an association ($p < 0.10$) between tooth brushing frequency and age at which the child had started brushing with toothpaste; schoolchildren who did so before the second birthday had higher tooth brushing frequency at the ages when data were collected (87.6% vs 79.2%), compared to those children who had not started such custom by the second birthday.

Table 2: Bivariate analysis of the frequency of tooth brushing (at least once a day) and the independent variables included in the study

Variables	< 6 x week	Daily	p-value
Mother's maximum level of schooling (years)	8.47 \pm 4.75	9.80 \pm 4.48	$z = -2.022$ $p = 0.0431^*$
	n (%)	n (%)	
Age			
6–7 years	38 (15.4)	209 (84.6)	$\chi^2 = 6.7105$
8–9 years	21 (28.8)	52 (71.2)	$p = 0.010^\dagger$
Sex			
Girls	28 (18.4)	124 (81.6)	$\chi^2 = 0.0001$
Boys	31 (18.5)	137 (81.5)	$p = 0.994^\dagger$
Started brushing with toothpaste			
After 2 nd birthday	48 (20.8)	183 (79.2)	$\chi^2 = 3.0287$
Before 2 nd birthday	11 (12.4)	78 (87.6)	$p = 0.082^\dagger$
Mother's attitude toward oral health of child			
Negative	18 (14.6)	105 (85.4)	$\chi^2 = 1.9219$
Positive	41 (20.8)	156 (79.2)	$p = 0.166^\dagger$

*Mann-Whitney, † Chi-square

DISCUSSION

This study aimed to determine the prevalence of daily tooth brushing, which was higher than 80% (at least once daily). We also identified that age, maternal education and age of starting to brush with toothpaste were variables related to current tooth brushing frequency in the child. The specific approach to measuring the prevalence of tooth brushing is somewhat difficult because frequency can be reported as one, two, or three times a day (or more); or at least once a day (12, 15, 19–21, 28). Differences pertaining to various patterns across age groups included in diverse studies make the issue more complex to compare across reports. Despite this lack of clearly defined frameworks, we note that the frequency of tooth brushing at least once a day was higher than in other countries, and in other parts of Mexico (12, 29).

Among the sociodemographic variables, we found age to be associated with the frequency of tooth brushing. In a study in Nicaragua (21), older schoolchildren brushed more frequently; similar results have been observed in other studies in Mexico (12, 13). We found that younger children brushed more often than older children. Although the age at which children can manage their own toothbrush is difficult to define universally, it has been suggested that the age at which parents should allow their kids to brush their teeth on their own should be as late as seven to eight years of age (30). We speculate that frequency of tooth brushing in children six to seven years in our study was higher possibly because they might have brushed with assistance from mothers/guardians, while the oldest group (eight to nine years) could be doing so without adult help. Older children already have considerable ability and psychomotor development (30) but we do not know if such feature applies to our sample, or if they could attain such independence in older ages.

Diverse studies around the world have noted that characteristics of parents influence healthy behaviours in children (31, 32). Investigations have found an association between socio-economic position (using the maximum level of schooling of father and mother as proxy indicator) and tooth brushing frequency among schoolchildren (14, 28, 33, 34). Although at present the mechanism that links these variables is not well understood, some authors have proposed various interpretations, such as the influence of the community where children live. For example, in residential areas characterized by low levels of education, health outcomes may be modified even independently of individual educational level and social class. It is also possible that a combination of community and individual moderators may be at play (35). Other, complementary interpretations posit whether people of lower socio-economic status have fewer resources at their disposal to meet oral health challenges: less free time; less money to buy toothpaste and toothbrushes, lacking immediate access to potable water, lower education and/or more rudimentary health behaviours derived from restricted access to information, knowledge, and formal education among other things. Competing

priorities for limited resources may relegate oral health issues to a secondary level of importance (15, 21).

While there are some studies that have found no relationship between oral outcomes in a child and the oral health attitudes or knowledge in the mother (24, 33) the bulk of the scientific literature supports the existence of such link (13, 21, 31, 32). Paradoxically, earlier beginning of tooth brushing with toothpaste can be considered a positive feature in the overall attitude toward oral health; perhaps the slight association we found in this regard is suggestive of a trend to the acquisition of positive behaviours in oral health, in particular in the context of oral health behaviours not being an isolated health behaviour (28).

Among the methodological strengths of this study is that we sought the reported frequency of tooth brushing from the mother/guardian, not the child. Although most epidemiological studies of oral health in schoolchildren use self-administered questionnaires to evaluate some conditions related to oral health, that information may be biased, especially if children are involved (36). This study has limitations that must be taken into account to properly interpret the results, in particular the cross-sectional design: it cannot establish causal relationships, rather only associations between independent variables and the frequency of tooth brushing. Furthermore, the study did not assess the technical appropriateness or proficiency at tooth brushing, the length of time spent in each brushing episode, nor if there was supervision by an adult.

We conclude that prevalence of daily tooth brushing was high compared to other studies. The mother's maximum level of schooling (proxy indicator of socio-economic position) was positively associated with the frequency of tooth brushing. A limited array of maternal characteristics seemed to be associated with one key oral health behaviour of their children. Our results are one stepping stone to designing oral health programmes aimed at preschool and schoolchildren while taking into account individual and group characteristics in mother-child dyads, so that appropriate, relevant and acceptable models are followed to improve oral health outcomes among children.

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