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Original Research Article

Epidemiological study to determine factors associated with dental caries in schoolers

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Abstract

Introduction: Dental caries is a large problem affecting all population. In Brazil, caries prevalence has decreased over the last years, but it is still a public health issue requiring frequent evaluation and care by dentists. **Objective:** To evaluate the oral health conditions of schoolers aged 5-12 years relating them with socioeconomic and demographic determinants. **Material and methods:** The children were examined by a previously calibrated examiner to obtain DMF and dmf scores. The parents answered a questionnaire regarding to the socioeconomic condition. Prior to the examinations, the parents signed a free and clarified consent form and only their children were evaluated. The results were analyzed descriptively and by Chi-square test, at significance level of $p<0.05$. **Results:** The sample (n=111) showed a mean age of 7 ± 1.7 years (mean $\pm$ standard deviation), composed of 58 boys and 58 girls. 66.6% of the sample exhibited dmf values = 0, while 102 schoolers had DMF values = 0. With regard to the parents' education level, 78.37% of the mothers had more than 9 years of education and 43.34% of the fathers had 9 to 11 years of study. Concerning to family income, 36.93% of the families presented mean income of 1-3 minimum wages (R$ 788.00 to R$ 2,364.00). No statistically significant differences ($p\leq0.05$) were seen between caries rates vs. parents' education and caries rates vs. family income. **Conclusion:** 5-12 year schoolers showed low dmf and DMF values, suggesting that parents' education and income might have influenced

on the results. Further studies are necessary to understand/assess the predisposing factors to dental caries development.

Introduction

Dental caries is a multifactorial disease affecting most of the worldwide population. Interconnected factors influenced on the risk for developing the disease, among them environmental factors (oral bacteria), behavioral factors (diet and oral hygiene), endogenous resources (tooth position and morphology; enamel composition; salivary composition and flow), and demographic characteristics (age, sex, race, socioeconomic status and access to oral health care) [1, 8].

Moysés [16] observed that the worst socioeconomic conditions are directly related to a higher consumption of sugar, worst oral health condition, difficulty of access to toothbrushes and dentifrices, difficulty of access to dental care, leading the population more exposed to these risk factors consequently increasing dental caries prevalence.

Baldani *et al.* [3] conducted an epidemiologic survey associating dental caries to socioeconomic factors in many cities of Parana, Brazil through DMF value and social aspects showed in databases (IBGE and DataSUS) and found that the cities with the lower incomes and education had the higher caries prevalence.

The study of Martins *et al.* [14] aimed to investigate through multivariate analysis the association of caries with variables as: parents' education, number of people living in same house, school type and family income. The data were collected through DMF scores and questionnaire. The authors found a direct relationship between caries development in children having the lowest family income, studying in public schools and whose parents had the smallest education level.

The epidemiologic surveys are necessary both for knowing the prevalence of oral diseases and evaluating the oral treatment needs [19]. These studies are associated with the application of structured questionnaires with demographic, socioeconomic, behavioral and access to health service variables. Such methodology enables to evaluate the possible association of these variables with caries disease.

One way of diagnosing and measuring the problems in oral health area is to use the health indicators. In Dentistry, an index frequently employed in epidemiologic surveys to assess the number of teeth affected by caries is DMF (dmf), proposed by Klein and Palmer, in 1937. Over the last decades, other indexes have been created and modified to meet the research's objectives. However, DMF index is a valuable, reliable, sensible, and acceptable index to be used to assess oral health regarding to caries in a population [22].

It is of utmost importance for any planning and action in health promotion to collect epidemiologic data to evaluate the situation of the health conditions of a given population. Notwithstanding, some Brazilian cities, as the city of Pinhais, does not have epidemiologic data on oral health of 5-12 year schoolers, the age range considered by WHO [4].

Given that importance and aiming to understand the oral health situation this study aimed to investigate the association between caries severity and its determinants in 5-12 year schoolers in the city of Curitiba, Parana, Brazil.

Material and methods

This present study was conducted according to Declaration of Helsinki and after the approval of the Institutional Review Board regarding ethical aspects (protocol no. #879404).

The sample comprised 111 schoolers of the Municipal School Campo Mourão (city of Curitiba, Parana, Brazil) aged between 5 and 12 years, regularly enrolled and living in the city of Curitiba whose parents read and signed a free and clarified consent form. Exclusion criteria comprised the presence of fixed orthodontic appliances and lack of signature on the free and clarified consent form.

DMF and dmf indexes were used to evaluate dental caries, according to the guidelines of the World Health Organization [19]. Both the examiner and the note taker were trained and calibrated. All examinations were performed with the aid of disposable wooden spatula, and both the child and the examiner were seated, under natural light, strictly following the biosecurity guidelines. Both the examiner and note taker wore apron, hat, mask and disposable gloves during the examinations.

Aiming at the socioeconomic analysis, a questionnaire was sent to all parents comprising the following variables: years of education of the father and mother; number of rooms in the house; house type; number of people living in the house; number of gadgets in the house (TV, DVD, computer, car, and washing machine); and parents' perception towards the oral health of the child. This questionnaire was based on the interview guide of SB Brazil Project, with some modifications to meet the aims of this present study and the age range of interest.

The data were tabulated and submitted to descriptive statistics analysis to obtain the final results.

Results

With regard to sample characterization, the schoolers (n=111) had mean age of 7±1.7 yeas (mean ± standard deviation), with 58 males and 53 females (n=111).

Considering dmf values (primary teeth), most of the sample showed values equal or close to 0 (66.6%), with mean ± standard deviation of 0.86±1.61 (figure 1). For permanent dentition, DMF values evidenced very low caries rate because DMF mean ± standard deviation was 0.13±0.469 (figure 2).

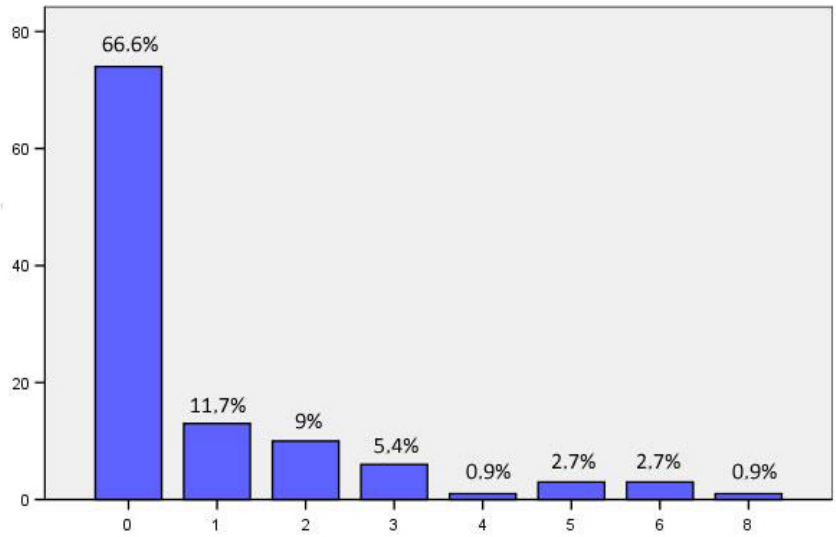

Figure 1 - Percentage relative frequencies of dmf indexes (0 to 8) in 5-12 year schoolers (0.86±1.61)

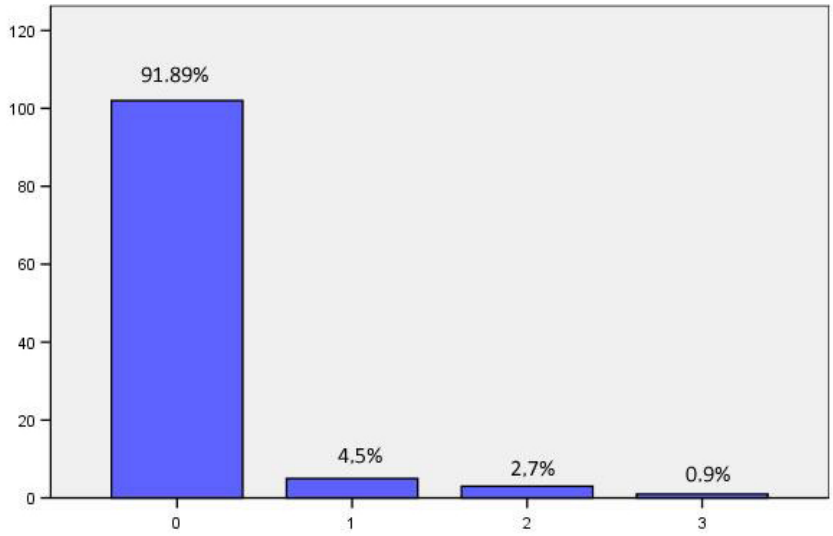

Figure 2 - Percentage relative frequencies of DMF indexes (0 to 3) in 5-12 year schoolers (0.13±0.469)

With respect to the parents' education, the mothers exhibited a mean of 3.89 ± 1.33 years of study. 6.3% did not answered, 0.9% did not attend school, and 5.4% had from 1 to 4 years of study (basic education), 9% had from 5 to 8 years of study (elementary school), 41.44% from 9 to 11 years of study (high school) and 36.93% more than 12 years of study (college) (figure 3). On the other hand, 43.34% of the fathers had from 9 to 11 years of study with mean ± standard deviation of 3.74 ± 1.27 (figure 4).

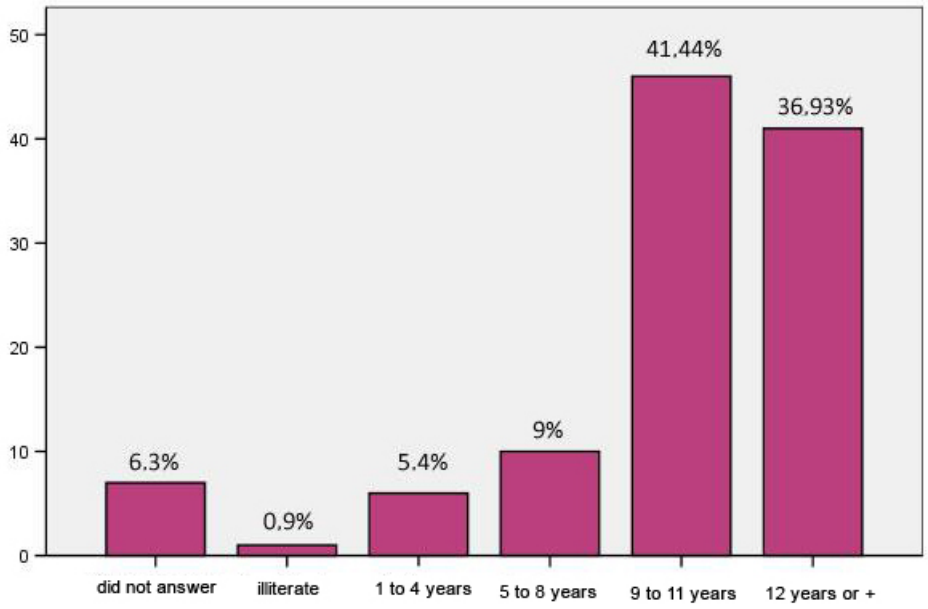

Figure 3 – Relative frequencies regarding to the mothers' education (3.89 ± 1.33)

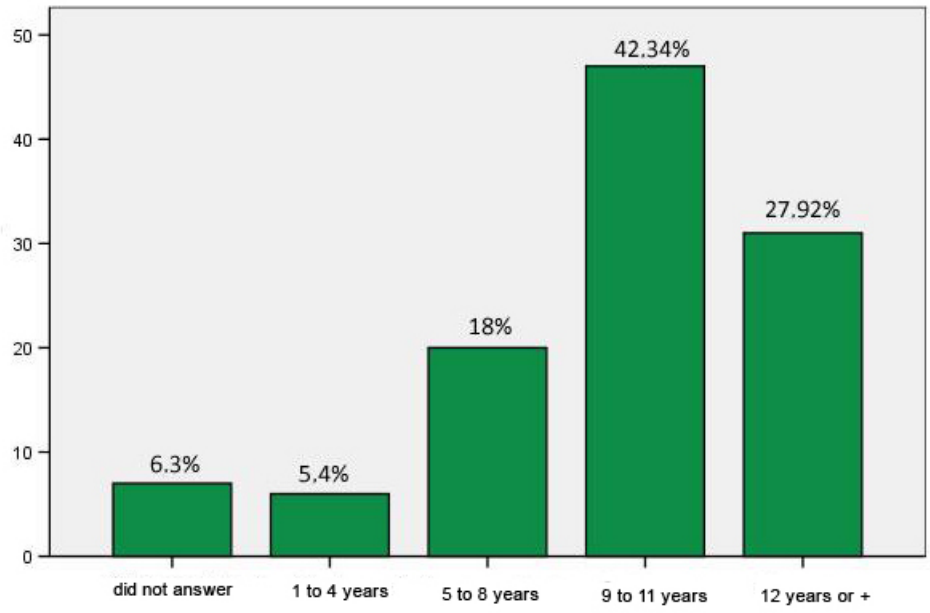

Figure 4 – Relative frequencies regarding to the fathers' education (3.74 ± 1.27)

It was possible to verify the family income and 36.93% of the families had an income from 1 to 3 minimum wages (R$ 788.00 to R$ 2,364.00), 27.92% had from 3 to 5 minimum wages (R$ 2,364.00 to R$ 3,940.00) (2.42 ± 1.24). 13.5% of the respondents did not report the family income (figure 5).

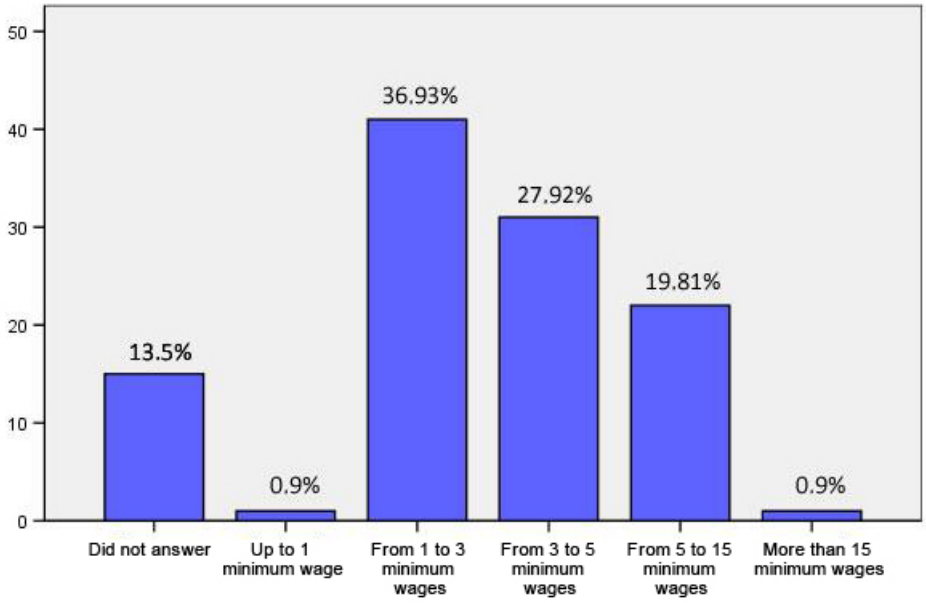

Figure 5 – Frequencies related to the family income of 5-12 schoolers (2.42 ± 1.24)

The association between the dmf and DMF indexes, parents' education, and family income did not show statistically significant differences (p≤0.05) (table I).

Table I – Association of the caries determinant factors (family income and education) with dmf and DMF values (p≤0.05)

Caries determinants	**Caries index (mean±standard deviation)**			
	dmf	**Significance p≤0.05**	**DMF**	**Significance p≤0.05**
Mother's education				
Illiterate	0±0,0		0±0.0	
1 to 4 years	1.33±2.42		0±0.0	
5 to 8 years	1.4±1.8	p=0.881	0.1±0.31	p=0.932
9 to 11 years	0.76±1.53		0.17±0.57	
12 years or +	0.88±1.6		0.7±0.34	
Father's education				
1 to 4 years	0.33±0.81		0±0.0	
5 to 8 years	1±1.5	p=0.903	0±0.0	p=0.06
9 to 11 years	0.83±1.7		0.33±0.44	
12 years or +	0.84±1.3		0.1±0.39	
Family income				
Did not answer	0.87±1.4		0.33±0.61	
Up to 1 wage	0.78±1.4		0±0.0	
From 1 to 3 wages	1.06±2	p=0.928	0.20±0.64	p=0.438
From 5 to 15 wages	0.73±1.4		0.03±0.10	
Higher than 15 wages	0±0.0		0±0.0	

Discussion

The result of this study exhibited a mean dmf/DMF of 0.86 and 0.13, respectively, for 5-12 year-old children. These are favorable data when compared to those of the Brazilian health survey, whose means were 2.46 for 5 years and 1.53 for 12 years [6]. By analyzing this aforementioned result, one can infer that dental caries has been controlled and prevented in the studied population, providing a better quality of life to the children.

The epidemiologic studies have been frequently conducted and enable the monitoring of the caries experience in children and adults in Brazil. Most of these studies cover the prevalence and severity of caries in preschoolers and schoolers, by assessing the prevalence of decayed teeth, oral hygiene, and factors associated with the parents and/or guardians [23].

Many researches indicate that the relation of demographic, socioeconomic and behavioral factors is also of utmost importance for dental caries development. The factors most having the highest positive association with dental caries development were: low parents' education, family income, social class [1, 5, 9, 10, 17, 23-26], and school type [7, 14].

The evaluated children studied at a public school in the city of Curitiba. Notwithstanding, they showed low index of decayed tooth with 91.89% of the sample without decayed primary tooth and 74.77% of the sample without decayed permanent tooth. These results are different from those observed by Barbosa *et al.* [4], who evaluated the dental caries prevalence in 5 year-old children studying in public schools in the city of Curitiba and found a high dental caries index (52.9%).

Some authors considered that socioeconomic situation is a determinant factor for risk to caries disease and this can be characterized as a disease of developing countries, such as Brazil [12, 16]. It is worth affirming that in this present study, the families mostly exhibited (48.63%) an income equal to or higher than R$ 2,364.00, classified as middle class. One can infer that the social level interfere on dmf and DMF values, because the schoolers had low caries index, although without statistically significance ($p \leq 0.05$).

In the studies of Mendes *et al.* [15] and Nicolau *et al.* [18], youths of families with incomes of up to 2.4 minimum wages (R$ 1,891.2) had more prevalence of decayed teeth than those having family income higher than 2.4 minimum wages. Thus, low family income is associated with dental caries experience.

The studies of Oliveira *et al.* [20], Perera and Ekanayake [22], Aida *et al.* [1] and Van Nieuwenhuysen *et al.* [28] demonstrated that the family income and the parents' education were or were not related with caries presence. A study showed that the mothers with more than five years of education put their children at a higher risk of developing caries lesions than those mothers with higher education. The literature has reported that the parents' low education will influence the adoption of healthy oral hygiene habits of the children, so that periodical actions of oral health education and promotion are necessary towards to the parents and guardians are necessary [27].

In this present study, no statistically significance differences ($p<0.05$) were found in the association of parents' education with the caries index exhibited by the studied population, because both the mothers (78.37%) and the fathers (70.26%) had high education. Notwithstanding, the high education of the parents/guardians can be used as a possible explanation for the low dmf (66.6%) and DMF (91.89%) value equal to 0. Within this context, we can assume that the parents' education influence on the presence of the caries lesions of their children.

Identifying the collective factors predisposing to dental caries in preschoolers is a fundamental tool to enable suitable oral health care and redirection of the actions that should be targeted to health attention. It is of outmost importance during daily dental practice that both the individual and the collective oral health are treated through the universal access to the dental services and assuring the equity and resolutivity in treating the general and individual dental needs of a given population.

Conclusion

Based in the results, it can be concluded that:

- 5-12 year-old schoolers had low dmf/DMF values, indicating a healthy oral health and adequate oral hygiene care;
- The parents' education and the family income seems to influence on the caries index of the studied population;
- By relating the socioeconomic factors (family income) with parents' education, no statistically significant differences ($p \leq 0.05$) in the dmf/DMF values were found;
- Further similar studies are necessary to evaluate better the caries determinants in schoolers from public schools aiming at meeting the demands according to their needs.

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