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| ORIGINAL

Dental caries among preschool children: effects of social inequality and the impact of a university extension project

Cárie-dentária em pré-escolares: efeitos das desigualdades sociais e impactos de projeto de extensão universitária

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ABSTRACT

Objective: The aims of this study were to assess the prevalence of dental caries among preschoolers at public and private schools and to evaluate the associations among the prevalence of the disease, socioeconomic factors, and the impact of a university extension project. **Methods**: Five-year-old preschool children were examined and were divided into three groups: children from private schools who were not receiving regular preventive care (group 1), children from public schools who were not receiving regular preventive care (group 2), children from public schools who were receiving preventive care through a university extension project (group 3). The children were examined for decay-missing-filled index, and their caregivers were interviewed to collect data on socioeconomic factors. Fisher's and Chi-squared tests were used to analyze the data. **Results**: Group 1 showed better socioeconomic and oral conditions compared with groups 2 and 3. Parents'/guardians' level of education was associated with the presence of disease in their children; however, income showed no association. **Conclusion**: Dental caries were more prevalent in the group with worse socioeconomic indicators, and although the university extension project had been implemented in one of the groups, it was not able to overcome health inequalities.

Indexing terms: Dental caries. Preschool. Social inequity. Socioeconomic factors.

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RESUMO

***Objetivo**: O objetivo deste estudo foi verificar a prevalência da cárie dentária em pré-escolares de escola pública e privada, avaliando sua associação a fatores socioeconômicos e impactos projeto de extensão universitária. **Métodos**: Foram examinados pré-escolares de 5 anos, alocados em 3 grupos: G1 - crianças de colégio privado, sem projeto preventivo em saúde bucal; G2 - crianças de ensino público também sem cuidados preventivos regulares; G3 - pré-escolares de ensino público que recebem cuidados preventivos através de projeto de extensão universitária. As crianças foram examinadas para aferição do índice ceo-d e seus responsáveis foram entrevistados para verificação de fatores socioeconômicos. Para análise dos dados foi utilizado o teste de Fisher e o teste Qui-quadrado **Resultados**: A escola referente ao G1 mostrou melhores condições socioeconômicas e bucais, comparada com os grupos G2 e G3. A escolaridade dos pais esteve associada à presença de doença nos filhos, porém, a renda não demonstrou associação. **Conclusão**: A cárie dentária foi mais prevalente no grupo com piores indicadores socioeconômicos, e apesar do projeto de extensão universitária em saúde bucal estar presente em uma das situações ele não foi capaz de superar as desigualdades em saúde.*

***Termos de indexação**: Cárie dentária. Pré-escolar. Iniquidade social. Fatores socioeconômicos.*

INTRODUCTION

Dental caries is the most common multifactorial and chronic disease in children, and because the disease is highly prevalent and preventable and has an impact on the individual's quality of life and on the conditions of society, dental caries is a worrying public health problem [1-3] The most recent epidemiological survey carried out in Brazil showed that dental caries was prevalent in 53.4% of the examined children, who were 5 years of age; these children had an average number of decayed, missing, and filled teeth (dmft) of 2.43. [4]

Currently, the occurrence of carious lesions is associated with biological, socioeconomic, cultural, and behavioral factors established by the presence of Streptococcus mutans, biofilm accumulation caused by the difficulty or insufficiency of hygiene, consumption of foods rich in sucrose, lack of knowledge of the importance of health, and lack of access to individual and collective preventive services [5,6] Thus, people living in precarious conditions are more susceptible to risk factors [7].

In the last decade, a decline in the prevalence of dental caries among the Brazilian population has been observed. This decline is primarily due to the increase of the individual's exposure to fluoride through fluoridation of the water supply, use of topical fluoride in school programs, and addition of fluoride in the dentifrices. Moreover, the expansion of actions in oral health promotion and education and the increased access to dental services have contributed positively to the prevention of dental caries [3,8]. However, when the prevalence of the disease is compared between children who are 12 and 5 years of age, in the former, the decline has been much more constant, whereas in the latter, the decline has been slow [4,8].

Thus, the expansion of public health programs that meet the needs of the population is essential [9,] because neglect of oral health can lead to suffering, discomfort, and chronic pain in children with untreated carious lesions [10]. The development of extension projects that include oral health education and services is an important strategy in the health promotion and prevention of diseases, particularly in schools, which offer a favorable environment for implementation of these projects [11].

Because dental caries is an avoidable disease, as mentioned earlier, it is possible to improve, plan, and amplify health education activities to improve the epidemiological situation. Thus, the aims of this study were to assess the prevalence of dental caries among preschoolers at public and private schools and to evaluate the associations among the prevalence of the disease, socioeconomic factors, and the impact of a university extension project.

METHODS

A cross-sectional, quantitative descriptive study was carried out to evaluate the presence of dental caries and the association of the disease with socioeconomic and demographic factors among 5-year-old schoolchildren in the city of Presidente Prudente, São Paulo, Brazil.

The choice of schools was due to the socioeconomic levels of the students, because, as the concept of polarization of dental caries suggests, the disease is concentrated in the portion of the population less favored socioeconomically [7].

Three schools participated in the study. Of the three schools, two were public schools and one was a private school. The public schools were located on the outskirts

of the city, one of which was currently participating in a university extension project there were five years, which consisted of weekly oral hygiene orientation, supervised brushing, and educational activities related to oral health. The private school was located in the central region of the city and was not participating in any type of program related to oral health. The study's age inclusion criterion was based on recommendations for the evaluation of deciduous teeth provided by the World Health Organization [11] Inclusion criteria were as follows: participants should be between 5 and 6 years of age, be authorized by the parents/guardians to participate in the study, and should consent to the examination.

The study sample consisted of 57 children: 13 were students from the private school (a school not participating in the dental extension project) (group 1), 20 were students from the public school that was not participating in the dental extension project (group 2); and 24 were students from the public school that was participated in the dental extension project, (group 3).

In order to gather data on the oral conditions of the children, dmft index was recorded using an odontogram. The exams were conducted in the schools themselves, under natural light and lasted approximately 5 minutes each. During the clinical examination, the subjects sat on chairs, with their head adjusted, facing the examiner. The examination was performed by only one examiner and one annotator. Data were collected on family socioeconomic status, schooling, and oral morbidity (all reported by the parents/guardians) using an adapted form of the project SBBrasil 2010 survey [12]. The form was completed by the investigator, who filled in the parent's/guardian's verbal responses.

The factors of interest included number of dmft (children), family income, school attendance, number of people living in the house, number of bedrooms, number of belongings (refrigerator, stereo, microwave, telephone, washing machine, dishwasher, computer, and car), self-perception regarding oral health, dental pain in the past 6 months prior to collection of data, pain intensity, access to dental treatment, frequency of visits to the dentist, place of consultation (public, private, or health insurance), reason for the consultation and perception about the care received.

The children who presented a need for treatment were referred to a primary health care unit, in which the university provides children's dental care.

Data were tabulated with the statistical software Epi Info v.7 (Centers for Disease Control and Prevention, Atlanta, GA, USA) and analyzed with BioEstat v.5.3 (Instituto Mamirauá; Tefé, Brazil). To verify the association between the variables, Chi-squared and Fisher's exact tests were applied at a significance level of .05.

All ethical guidelines for human research described in Resolution 466/12 of the National Health Council (Brazil) were followed, and the project was approved by the Research Ethics Committee of Unoeste (#292.921, CAAE 15201613.4.0000.5515).

RESULTS

Fifty-five, 5-year-old children were examined, of whom only 22.8% were enrolled in private school. With regard to gender, the sample was more uniform. Slightly more than half (52.6%) of the participants were male.

With regard to the evaluation of dmft, 40.35% of the children were free of caries, 47.37% presented at most 4, and the remaining 12.28% presented 5 or more. There was no statistically significant difference in the presence of caries between the sexes (P>.05).

The mean dmft index for the 57 participants was 1.94 (standard deviation [SD]=2.57) (as shown in Table 1). For students from the private school (group 1), the dmft was 0.46 (SD=0.88). For students from the public school with no oral health extension project (group 2), the dmft was 1.50 (SD=1.82). For students from the public school with an extension project (group 3) the dmft was 3.12 (SD=3.18).

Table 2 presents the percentage distribution of the parents/guardians by responses to the socioeconomic questions. Among the analyzed questions, it was possible to verify statistical association between schooling of parents/guardians and number of bedrooms with dental caries in children (P<.05). Family income did not show a statistically significant relationship with the dmft index (P>.05).

Table 3 presents the results of parent/guardian responses with regard to the self-assessment of oral condition, perception of the need for treatment in oral health, presence of pain in the past 6 months, and use of dental services.

The need for treatment was positively reported in group 1 by 53.85% of parents/guardians, in group 2 by 90% of parents/guardians, and in group 3 by 87.5% of

Table 1. dmft index according the school, Presidente Prudente, 2018.

dmft	G1		G2		G3		Total	
	N	%	N	%	N	%	N	%
0	9	39.13	7	30.43	7	30.43	**23**	40.35
1	3	30.00	6	60.00	1	10.00	**10**	17.54
2	–	–	3	50.00	3	50.00	**6**	10.53
3	1	25.00	1	25.00	2	50.00	**4**	7.02
4	–	–	2	28.57	5	71.43	**7**	12.28
≥ 5	–	–	1	14.29	6	85.71	**7**	12.28
Total	**13**	22.81	**20**	35.09	**24**	42.11	**57**	100.00

Table 2. Percentage distribution of the number of people living at the house, number of bedrooms, number of belongings, family income, parents school attainment, according the school, Presidente Prudente, 2018.

Number of people living in the house	G1		G2		G3		Total	
	n	%	n	%	n	%	n	%
1 – 3	0	0.00	1	5.00	1	4.17	**2**	**3.51**
3 – 5	10	76.92	9	45.00	13	54.17	**32**	**56.14**
5 – 7	3	23.08	10	50.00	10	41.67	**23**	**40.35**
Number of bedrooms*								
1	0	0.00	2	10.00	5	20.83	**7**	**12.28**
2	2	15.38	11	55.00	14	58.33	**29**	**47.37**
3	8	61.54	5	25.00	5	20.83	**18**	**31.58**
4	3	23.08	2	10.00	0	0.00	**5**	**8.77**
Number os belongings								
3 – 9	0	0.00	13	68.42	13	52.00	**26**	**45.61**
9 – 12	6	46.15	3	15.79	6	24.00	**15**	**26.31**
12 ou mais	7	53.84	2	10.53	5	20.00	**14**	**24.54**
Did not answer	0	0.00	1	5.26	1	4.00	**2**	**3.50**
Family Income								
R$251 - R$500	0	0.00	2	10.00	1	4.17	**3**	**5.26**
R$501 - R$1.500	0	0.00	11	55.00	11	45.83	**22**	**38.60**
R$1.501 - R$2.500	2	15.38	2	10.00	9	37.50	**13**	**22.81**
R$2501 - R$4.500	4	30.77	4	20.00	2	8.33	**10**	**17.54**
R$4.501 - R$9.500	4	30.77	0	0.00	0	0.00	**4**	**7.02**
+ de R$9.501	3	23.08	0	0.00	0	0.00	**3**	**5.26**
Did not answer	0	0.00	1	5.00	1	4.17	**2**	**3.51**
School attainment**								
1 – 5 years	0	0.00	2	10	3	12.5	**5**	**8.77**
5 – 9 years	0	0.00	7	35	3	12.5	**10**	**17.54**
9 – 12 years	0	0.00	10	50	16	66.66	**26**	**45.61**
12 – 16 years	4	30.77	1	5	2	8.33	**7**	**12.28**
16 – 22 years	9	69.23	0	0	0	0	**9**	**15.78**

*G1 and G3 showed $p<0.05$ among number of bedrooms and dmfs index

**$p<0.05$ among school attainment and dmfs index

Table 3. Percentage distribution of the need for treatment, tooth pain in the past 6 months, pain intensity, characteristic of the dental consultation of the parents/guardians', according to the school, Presidente Prudente, 2018.

	G1		G2		G3		Total	
	n	%	n	%	n	%	n	%
Refered treatment need								
Yes	7	53.85	18	90.00	21	87.50	**46**	**80.70**
No	6	46.15	2	10.00	3	12.50	**11**	**19.30**
Pain in the past 6 months								
Yes	2	15.38	8	40.00	5	20.83	**15**	**26.32**
No	11	84.62	12	60.00	19	79.17	**42**	**73.68**
Pain intensity								
Unbearable	1	50.00	5	62.50	2	40.00	**8**	**53.33**
Moderate	0	0.00	1	12.60	2	40.00	**3**	**20.00**
Mild	0	0.00	2	25.00	1	20.00	**3**	**20.00**
Did not answer	1	50.00	0	0.00	0	0.00	**1**	**6.67**
Already went to the dentist								
Yes	13	100.00	19	95.00	24	100.00	**56**	**98.25**
No	0	0.00	1	5.00	0	0.00	**1**	**1.75**
Last Dental Consultation								
Less than 1 year	10	76.92	9	45.00	10	41.67	**29**	**50.88**
1 - 2 years	2	15.38	2	10.00	5	20.83	**9**	**15.79**
3 or more years	1	7.69	7	35.00	8	33.33	**16**	**28.07**
Did not answer	0	0.00	2	10.00	1	4.17	**3**	**5.26**
Motivo da consulta								
Routine	7	53.85	4	21.05	6	25.00	**17**	**30.36**
Pain	3	23.08	6	31.58	6	25.00	**15**	**26.79**
Extraction	0	0.00	2	10.53	3	12.50	**5**	**8.93**
Treatment	3	23.08	7	36.84	8	33.33	**18**	**32.14**
Other	0	0.00	0	0.00	1	4.17	**1**	**1.79**

parents/guardians. Pain was present in the past 6 months in only 26.32% of the cases, of which the majority were in groups 2 and 3, and only 3.5% of the cases were in group 1. With regard to access to dental treatment, only 1.75% reported never having gone to the dentist. All of these respondents were from group 2. In group 1, 76.92% of the parents/guardians had received dental treatment in the past year, followed by 45% of the individuals in group 2, and 41.67% in group 3, corresponding to slightly more than half of the sample.

DISCUSSION

Study results indicate that caries still affect more than half of the preschool population and that we have failed to meet a goal set decades earlier by the World Health Organization, which was that 50% of children between 5 and 6 years of age would be free of caries by the year 2000 [13].

Using the dmft index, we found that the presence of dmft was higher in public schools (groups 2 and 3), suggesting that in lower socioeconomic groups there is a higher concentration of dental caries [2,8,14] and although there has been no significant statistical relationship between dmft and family income, other factors, such as eating habits, hygiene, environmental conditions, and access to information, [7] may influence the disease.15-19 However, the highest dmft index was found in group 3 (in the school where the university extension project was being carried out), followed by group 2. This finding does

not correspond to what is found in the literature [20,21] which suggests that the promotion and education in health, together with supervised brushing, were important methods of dental caries prevention.

However, this contradiction can be explained by the fact that group 3's school is located in a peripheral area of the city, with discontinuous growth and a large population that previously occupied favelas and were assigned to such subdivisions. Currently, this population suffers from an increase in demand for school and health services due to the creation of two new adjacent districts. These characteristics are likely to have direct and indirect influence on the health conditions of individuals who reside in the area. According to Whitehead and Dalgren,[4] health inequalities are systematic differences that can be observed in the entire population due to socioeconomic differences that are socially produced. Thus, social determinants can exert such a massive influence that even when children have access to dental treatment, these differences are not eliminated, leading to the presence of oral diseases. To combat health disparities, the Brazilian government has in recent years invested in income transfer programs. To receive this benefit certain requirements must be fulfilled, and accessing education, health, and social assistance is required and supported [22].

With regard to the parents'/guardians' access to dental treatment in the past year, group 1 presented a higher percentage, followed by groups 2 and 3, suggesting that access to health care is linked to socioeconomic condition. With regard to the reason for the consultation, it was observed that parents/guardians in group 1 mostly sought routine care, whereas parents/guardians in groups 2 and 3, sought dental care when there were already problems. A study by Lu et al. [23] also had similar findings. Given this and according to what is found in the literature dental care as a routine and with preventive guidelines, are associated with better oral health.

With regard to socioeconomic conditions, our study found that families with larger numbers of individuals were more prevalent in groups 2 and 3. In these two groups, 50% of families had household incomes below 1,500 Brazilian reais. Our results suggest that socioeconomic circumstance is positive for access to dental treatment because for most of the families in group 1, the household income was between 2,500 and 9,500 Brazilian reais, and access to dental treatment was higher in this group. In their study, Gülcan et al. [24] found that the differences in access to dental treatment due to monetary conditions contribute negatively to quality of life.

The educational level and living conditions of the parents/guardians affect their socioeconomic status and knowledge, and this knowledge provides the ability to choose healthier behaviors [25]. This is supported by the data obtained in this study. These data are compatible with studies presenting the same analysis. Nobile et al. [25] showed a significant decrease in caries prevalence, ranging from 31.3% in children whose parents/guardians had only elementary education to 18.5% in those whose parents/guardians had university degrees.

Our results indicate that the oral health of preschool children is directly related to the oral health of their parents/guardians. Moimaz et al. [26] found a relationship between irregular visits of the mother to the dentist and no visit of the child. The authors' findings suggest that poor socioeconomic conditions are associated with neglect of oral care. Thus, low levels of education of parents/guardians can also negatively influence the oral health of their children [10,18,27].

The parents'/guardians' perception of their childrens' oral health is also very important in this process [28]. Children tend to mimic the behaviors of their parents/guardians, demonstrating that family relationships are important in oral health [27].

Brazilian dentistry is evolving; however, it is extremely necessary that it prioritize preventive actions and health promotion, because the high rates of dmft reveal that dentistry is still focused on the curative approach and not on prevention [22]. In schoolchildren, encouragement for measures to strengthen oral health should be directed toward actions that promote health, such as health education, supervised brushing, topical application of fluoride, and dietary guidance [29].

Our study does have some limitations. Because this is a cross-sectional study, the data allow us to suggest hypotheses regarding the associated factors, but do not allow us to make causal inferences. The specificity of the sample may also be considered as a limitation in the overall understanding of the dmft index.

CONCLUSION

Dental caries were more prevalent in the group with worse socioeconomic indicators, and although

the university extension project in oral health had been implemented in one of the schools, it was not able to overcome the inequalities in health.

University extension projects positively influence prevention and health promotion; however, there are factors that promote health disparities that require broader approaches, especially in the health education provided to the families of these children. These approaches should address improvements in knowledge and, consequently, in behavior that favor the health of the family as a whole.

Collaborators

DJR GUSMAN, LQ Telles e RL PRADO participed in the study concept and design. ME BASTIANINI, DJR GUSMAN e LQ TELLES participed in the acquisition of data, statistical analysis and drafting of manuscript. ME BASTIANINI, DJR GUSMAN, LQ TELLES, LRS ASSUNÇÃO, JA MARSICANO e RL PRADO worked in final revision of the manuscript.

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