Braz J Oral Sci.
April/June 2009 - Volume 8, Number 2

Original Article

# Dental caries experience in preschool children of Bauru, SP, Brazil

Fábio Silva de Carvalho[1], Cristiane Alves Paz de Carvalho[1], Roosevelt da Silva Bastos[1], Angela Xavier[2], Sabrina Pulzatto Merlini[3], José Roberto de Magalhães Bastos[4]

[1] DDS, MS, Graduate student, Department of Pediatric Dentistry, Orthodontic and Public Health, Faculdade de Odontologia de Bauru, Universidade de São Paulo (USP), Bauru (SP), Brazil
[2] DDS, Undergraduate student, Department of Pediatric Dentistry, Orthodontic and Public Health, Faculdade de Odontologia de Bauru, USP, Bauru (SP), Brazil
[3] DDS, Department of Pediatric Dentistry, Orthodontic and Public Health, Faculdade de Odontologia de Bauru, USP, Bauru (SP), Brazil
[4] DDS, MS, PHD, Professor, Department of Pediatric Dentistry, Orthodontic and Public Health, Faculdade de Odontologia de Bauru, USP, Bauru (SP), Brazil

## Abstract

**Aim**: The main purpose of this study was to evaluate dental caries experience and prevalence in three to six-year-old preschool children from three public kindergartens of the city of Bauru, SP, Brazil. **Methods**: The sample comprised 283 children (142 boys; 141 girls) aged 3 to 6 years old. For data analysis, the dmft (decayed, missing and filled teeth), Significant Caries Index (SiC Index), percentage of caries-free children, Gini Coefficient and Care Index were determined. Mann-Whitney and Kruskal-Wallis tests were used with 5% significance. **Results**: The mean (SD) dmft index was 1.40 (2.63). Among the examined children, 63.25% were caries-free. The decayed component comprised 77.28% of the dmft. The Care Index was 19.70%, indicating limited utilization of dental treatment by children. The SiC index was 4.11 and the Gini Coefficient was 0.78 in the survey. The results showed that there were no statistically significant differences in the prevalence of the disease between the ages and between males and females. **Conclusions:** Dental caries experience and prevalence in preschool children were considered low in this study and the occurrence of polarization of the disease was identified.

**Keywords:** dental caries, child, preschool, oral health.

## Introduction

The fluoridation of the public water supply since the 1970s and the massive use of fluoridated dentifrices from the 1980s are scientifically recognized as the main responsible factors for dental caries decline in the last decades[1,2]. In spite of this, a heterogeneous distribution of dental caries has been observed, in which high disease levels have been identified in a minority of individuals[3].

Studies directed to primary dentition did report the same decline in the prevalence of caries and, additionally, reported an increase in the mean dmft, with high proportions of untreated caries[4-8].

In Brazil, few studies on caries prevalence in primary teeth have been developed over the last years. Age is an important factor to be regarded in order to better understand children's oral health in the primary dentition since past caries experience is considered as the most powerful predictor of the disease[9-11]. Epidemiological dental studies have shown changes in the distribution of dental caries and this trend has been investigated[4,6-8,11]. Epidemiological

**Received for publication:** April 29, 2009
**Accepted:** July 24, 2009

**Correspondence to:**
Fábio Silva de Carvalho
Universidade de São Paulo
Department of Pediatric Dentistry, Orthodontic and Public Health
Alameda Octávio Pinheiro Brisolla, 9-15
CEP 17012-901 – Bauru (SP), Brasil
E-mail: fasicar@usp.br

data would allow oral health administrators to plan specific measures according to oral health needs.

Due to the abovementioned considerations, the main purpose of this study was to evaluate dental caries experience and prevalence in three to six-year-old preschool children in three public kindergartens in the city of Bauru, SP, Brazil.

## Material and methods

This epidemiological study was carried out in the city of Bauru, located in the State of São Paulo, Brazil, which had an estimated population of 355,675 in 2008[12]. Fluoride has been added to water supply since 1975 in Bauru (0.07 ppm). The research protocol was approved by the Institutional Review Board (IRB) of Bauru Dental School, University of São Paulo, Brazil, (process nº 71/2008), and the authorization for conduction of study was obtained from the municipal secretary education and directors of kindergartens. Also, written informed consent was obtained from the parents/legal representatives prior to enrolment of the children.

### Sample

This study provided epidemiological data for the development of educational and preventive program in oral health in three public kindergartens. Information about total number of students in each unit by age was obtained from the directors of the kindergartens. There was a return rate of 77.43% (319 out of 412) of signed consent forms from parents/legal representatives. However, the final sample was reduced, since 36 children were absent on the examination day or refused to be examined despite the parents' consents. The study was conducted with 283 preschool children, 142 boys and 141 girls, aged 3 to 6 years old, corresponding to 68.69% of the total number of children in the three kindergartens.

### Examination methodology

The exams were done with the children seated on chairs under natural light. Materials used were dental mirror and CPI (Community Periodontal Index) probe[13]. The clinical examinations used for observation of the mean number of decayed, missing or filled teeth (dmft index) were performed according to the criteria established by the World Health Organization (WHO)[13]. Only one examiner was trained and calibrated for this study. During data collection, duplicate examinations of approximately 10% of the sample were performed to assess intra-examiner variability. Intra-examiner agreement for dental caries diagnosis was evaluated by means of the kappa coefficient, showing values of 0.92, whose agreement was considered to be excellent.

**Table 1.** Caries experience according to age and gender, Bauru, Brazil, 2008

| Variables | Sample | | Caries-free | | Mean dmft (sd) |
|---|---|---|---|---|---|
| **Age** | **n** | **%** | **n** | **%** | |
| 3 | 32 | 11.30 | 21 | 65.62 | 1.13 (1.90) |
| 4 | 97 | 34.28 | 63 | 64.95 | 1.42 (3.11) |
| 5 | 104 | 36.75 | 64 | 61.54 | 1.33 (2.28) |
| 6 | 50 | 17.67 | 31 | 62.00 | 1.68 (2.75) |
| Total | 283 | 100.00 | 179 | - | 1.40 (2.63) |
| **Gender** | | | | | |
| Boys | 142 | 50.18 | 87 | 61.27 | 1.65 (3.11) |
| Girls | 141 | 49.82 | 92 | 65.25 | 1.15 (2.03) |
| Total | 283 | 100.00 | 179 | - | 1.40 (2.63) |

DMFT: decayed, missing and filled teeth.

### Data analysis

Percentages of caries-free children and dmft were used to describe dental caries distribution among children. Significant Caries Index[14] (SiC Index), Gini Coefficient[15] and Care Index[16] were adopted to assess the unequal distribution of dental caries and oral health care.

SiC index was calculated by taking the mean dmft of the one-third of the individuals having the highest of dmft values in a given population[14], and was used to measure the polarization of the dental caries occurrence among children. The Care Index[16] was calculated using the means dmft without caries-free. The component "f" (filled teeth) was divided by the dmft and multiplied by 100. The Gini Coefficient was used to assess inequality of caries distribution in this study[15].

Mann-Whitney and Kruskal-Wallis non-parametric tests were used to check the statistical association between the studied variables. A significance level of 5% was adopted.

## Results

**Table 1** shows the caries experience according to age and gender. From the group of examined children, 179 (63.25%) were caries-free. Homogenous distribution, according to gender, was observed in this sample. The mean dmft was 1.40 to total sample. The boys had dmft greater than girls. The mean dmft was 1.13 at 3 years of age and 1.68 at 6 years of age. No statistically significant differences ($p > 0.05$) were found in this study with regard to the prevalence of disease among gender and age.

The decayed component comprised 77.28% of the dmft and the filling component 19.70%. One third of the sample concentrated 97.47% of the dmft distribution in the respective study. The SiC index was 4.11, the Care Index was 19.70% and the Gini Coefficient was 0.78.

## Discussion

Data from the last Brazilian Oral Health Survey (SBBrasil 2003)[17] showed dmft at 5 years of age of 2.80, which is similar to the results observed in other Brazilian cities, such as in Bilac[18] (2.84), Piracica-

ba[19] (2.68), Rio Claro[20] (2.50), Juiz de Fora[21] (2.40) and Teresina[22] (2.13). Mean dmft was lower in the cities of Paulínia[23] (1.90), Campinas[24] (1.68), Indaiatuba[25] (1.62) and higher in the city of Cambira[26] (3.51). In the present study, mean dmft was 1.33.

Breaking the dmft index into decayed ("d") and filled ("f") components revealed greater inequality in the distribution these components. At 5 years old, the decayed and filled represented respectively 78.99% and 18.12% of the dmft index. Higher values for the decayed ("d") component were found in the cities of Indaiatuba[25] (84.80%), Juiz de Fora[21] (87.60%) and Cambira[26] (92.30%), while lower values were found in the city of Campinas[24] (75.60%). The access to health services is not satisfactory to the children that participated of this study yet, as demonstrated by the small number of filled teeth in relation to the number of decayed teeth, as reported elsewhere[23]. Considering the total sample, the Care index values reached 19.70%, indicating a low coverage of the oral health service for the studied preschool children, as observed in the cities of Indaiatuba[25] (12.30%). Nevertheless, greater values were observed in Piracicaba[19] (23.10%), Rio Claro[20] (64.00%) and Paulínia[23] (65.40%). The results of another investigation carried out in Bauru showed an improvement in the oral health service coverage among 12-year-old children in 2006, since Care index reached 56.30%[27].

In this study, at 5 years old, 61.54% of the preschool children were caries-free. Lower values were observed in the cities of Cambira[26] (31.14%), Juiz de Fora (44.00%), Piracicaba[19] (44.30%), Bilac[18] (45.30%), Rio Claro[20] (51.00%), Paulínia[23] (54.20%), Teresina[22] (55.70%) and Campinas[24] (56.17%).

As observed in Bilac[18], Juiz de Fora[21], Teresina[22] and Cambira[26], the number of children affected by caries disease increased with age, with a percentage of children with dmft > zero at six years old greater than that at three years old.

The results also showed that 97.47% of the dmft distribution was concentrated in one third of the sample, which clearly demonstrated the phenomenon of caries polarization. This fact was not observed in the city of Teresina[22], where approximately 49% of the children presented caries.

SiC index was developed in 2000 to bring attention to those children with the highest caries scores in each population[28,29]. In the present study, SiC index was used to identify the group with highest caries rate and the value of 4.11 was found, lower than that recorded in other cities such as Bilac[18] (5.90), Itaí[30] (5.08) and Água Doce[31] (9.97).

Inequalities in caries distribution were measured by the Gini coefficient. This index indicate perfect inequality with a coefficient of 1 and perfect equality with a coefficient of 0. It has been used in a way to measure the association between exposure to a risk factor and disease prevalence[15]. A higher Gini coefficient means that the risk of disease is more variable amongst the population. In this study, the Gini Coefficient was of 0.78, which is similar to that obtained in a previous study carried out in Bauru[27] involving 12-year-old children (0.76), indicating an unequal distribution of caries in this municipality. This unequal distribution occurs due to different socioeconomic levels of the population according to Cypriano et al.[32], and some factors, such as local service organization, access to fluoridated water, preventive procedures and investment in public health, may change this trend.

Acquaintance with inequalities in the distribution of child caries must inevitably invite the question as causes of this phenomenon. There are several risk factors for caries experience, for example, transmissibility of oral bacteria and amount and timing of exposure to cariogenic foodstuffs and drinks, and difficulty of access to dental services.

It is important to mention that this study had some limitations. The sample was drawn from a population of three to six-year-old preschool children attending three public kindergartens. Therefore, the conclusions are valid only for this population. The educational and preventive program in oral health may change the epidemiological profile of caries in preschool children from these kindergartens. In addition to the dmft index, other approaches for caries evaluation should be considered. The SiC index and Gini coefficient supply the oral health service epidemiological data that allows the promotion of adequate oral health based on the community needs. The interaction of health professionals, educators and parents, and the planning of strategies may reduce the inequality distribution of dental caries in children to advance the oral health patterns.

In conclusion, dental caries experience and prevalence in preschool children were considered low in this study, and the occurrence of the polarization of the disease was identified.

## References


1. Truman BI, Gooch BF, Sulemana I, Gift HC, Horowitz AM, Evans CA, et al. Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. Am J Prev Med. 2002;23(1 Suppl):21-54.
2. Bratthall D, Hänsel-Petersson G, Sundberg H. Reasons for the caries decline: what do the experts believe. Eur J Oral Sci. 1996;104:416-22.
3. Marthaler T, Menghini G, Steiner M. Use of the Significant Caries Index in quantifying changes in caries in Switzerland from 1964 to 2000. Community Dent Oral Epidemiol. 2005;33:159-66.
4. Lucas SD, Portela MC, Mendonça LL. Variations in tooth decay rates among children 5 and 12 years old in Minas Gerais, Brazil. Cad Saude Publica. 2005;21:55-63.
5. Downer M. Caries prevalence in the United Kingdom. Int Dent J. 1994;44(4 Suppl 1):365-70.
6. Pitts NB, Boyles J, Nugent ZJ, Thomas N, Pine CM. The dental caries experience of 5-years-old children in England and Wales (2003/4) and Scotland (2002/3). Community Dent Health. 2005;22:46-56.
7. Cypriano S, Pecharki GD, Sousa MLR, Wada RS. Oral health of schoolchildren residing in areas with or without water fluoridation in Sorocaba, São Paulo State, Brazil. Cad Saude Publica. 2003;19:1063-71.
8. Hashim R, Thomson WM, Ayres KM, Lewsey JD, Awad M. Dental caries experience and use of dental services among preschool children in Ajman, UAE. Int J Paediatr Dent. 2006;16:257-62.
9. Creedon MI, O'Mullane DM. Factors affecting caries levels amongst 5-year-old children in Country Kerry, Ireland. Community Dent Health. 2001;18:72-8.
10. Li Y, Wang W. Predicting caries in permanent teeth from caries in primary teeth: an eight-year cohort study. J Dent Res. 2002;81:561-6.
11. Skeie MS, Raadal M, Strand GV, Espelid I. The relationship between caries in the primary dentition at 5 years of age and permanent dentition at 10 years of age – a longitudinal study. Int J Paediatr Dent. 2006;16:152-60.

12. IBGE. Institute Brazilian of Geography and Statistics. Estimate of the population residing in Brazilians municipalities on July 1, 2008. [Internet]. [cited 2009 ago 25]. Available from: <www.ibge.gov.br/home/estatistica/populacao/estimativa2008/POP2008_DOU.pdf>
13. Word Health Organization. Oral health surveys, basics methods. 4th ed. Geneve: WHO; 1997.
14. Nishi M, Stjernswärd J, Carlsson P, Bratthall D. Caries experience of some countries and areas expressed by the Significance Caries Index. Community Dent Oral Epidemiol. 2002;30:296-301.
15. Armfield JM, Spencer AJ, Slade GD. Changing inequalities in the distribution of caries associated with improving child oral health in Australia. J Public Health Dent. 2009;69(2):125-34.
16. Smith GE. Tooth decay in the developing world. N Z Med J. 1987;100:669-70.
17. Brazil. Health Ministry of Brazil. SB Brazil 2003 Project – Oral health conditions of the Brazilian population 2002-2003. Brasília, DF; 2004.
18. Martins RJ, Garbin CAS, Garbin AJI, Moimaz SAS, Saliba O. Declining caries rate in a municipality in northwestern São Paulo State, Brazil, 1998-2004. Cad Saude Publica. 2006;22:1035-41.
19. Cypriano S, Sousa MLR, Rihs LB, Wada RS. Oral health among preschool children in Brazil, 1999. Rev Saude Publica. 2003;37:247-53.
20. Hoffmann RHS, Cypriano S, Sousa MLR, Wada RS. Dental caries experience in children at public and private schools from a city with fluoridated water. Cad Saude Publica. 2004;20:522-8.
21. Leite ICG, Ribeiro RA. Dental caries in the primary dentition in public nursery school children in Juiz de Fora, Minas Gerais, Brazil. Cad Saude Publica. 2000;16:717-22.
22. Moura LFAD, Moura MS, Toledo OA. Dental caries in children that participated in a dental program providing mother and child care. J Appl Oral Sci. 2006;14:53-60.
23. Gomes PR, Costa SC, Cypriano S, Sousa MLR. Dental caries in Paulínia, São Paulo State, Brazil, and WHO goals for 2000 e 2010. Cad Saude Publica. 2004;20:866-70.
24. Cardoso SV, Pereira SM, Tagliaferro EPS, Pereira AC, Meneghin MC. Oral health conditions in Campinas: a critical evaluation. Arquivos em Odontologia. 2004;40:341-52.
25. Ueda EMO, Dezan CC, Frossard WTG, Salomão F, Morita MC. Prevalence of dental caries in 3 and 5-year-old children living in a small brazilian city. J Appl Oral Sci. 2004;12:34-8.
26. Peres MA et al. Social and biological early life influences on severity of dental caries children aged 6 years. Community Dent Oral Epidemiol. 2005; 33:53-63.
27. Rihs LB, Sousa MLR, Cypriano S, Abdalla NM, Guidini DDN, Amgarten C. Dental caries activity in primary dentition, São Paulo, Brazil, 2004. Cad Saude Publica. 2007;23:593-600.
28. Tagliaferro EPS, Meneghim MC, Ambrosano GMB, Pereira AC, Sales-Peres SHC, Sales-Peres A, et al. Distribution and prevalence of dental caries in Bauru, Brazil, 1976-2006. Int Dent J. 2008;58:75-80.
29. Bratthall D. Introducing the Significant Caries Index together with a proposal for a new global oral health goal for 12-year-olds. Int Dent J. 2000;50:378-84.
30. Sales-Peres SHC, Carvalho FS, Carvalho CAP, Bastos JRM, Lauris JRP. Polarization of dental caries in teen-agers in the Southwest of the state of São Paulo, Brazil. Cien Saude Colet. 2008;13(Suppl 2):2155-62.
31. Biazevic MGH, Rissoto RR, Michel-Crosato E, Mendes LA, Mendes MOA. Relationship between oral health and its impact on quality of life among adolescents. Braz Oral Res. 2008;22:36-42.
32. Cypriano S, Hoffmann RHS, Sousa MLR, Wada RS. Dental caries experience in 12-year-old schoolchildren in southeastern Brazil. J Appl Oral Sci. 2008;16:286-92.