

Changes in caries prevalence in 7-12-year-old children from Araraquara, São Paulo, Brazil: 1989-1995

Mudanças na prevalência de cárie em crianças de sete a 12 anos de Araraquara, São Paulo, Brasil: 1989-1995

Ercília Leal Dini ¹

Ana Lígia Rozato Foschini ²

Ioneide Maria Gomes Brandão ²

Sílvio Rocha Corrêa da Silva ¹

¹ Departamento de Odontologia Social, Faculdade de Odontologia de Araraquara, Universidade Estadual Paulista. C. P. 331, Araraquara, SP 14801-903, Brasil.
² Secretaria Municipal de Saúde, Prefeitura Municipal de Araraquara. Rua São Bento 840, Araraquara, SP 14801-901, Brasil.

Abstract *The aim of this study was to compare the prevalence of caries in 7-12-year-old children from Araraquara, São Paulo, Brazil, in 1989 and 1995. Systematic random samples were drawn from the population of children enrolled in public schools. The surveys were carried out by trained examiners using the DMFT index and WHO diagnostic criteria. There was an increase in the percentage of children free of caries in the permanent dentition in all age groups (from 29 percent in 1989 to 51 percent in 1995). Amongst 12 year olds, the DMFT index was 3.8 in 1989 and 2.6 in 1995. Decreases were observed in the percentages of children classified in the 1-3 DMFT index category (from 40 percent in 1989 to 31 percent in 1995) and in the 4-6 DMFT index category (26.6 percent in 1989 to 16.5 percent in 1995). There was also a reduction in the percentage of children with a DMFT of 7 or more (4.4 percent in 1989 to 1.5 in 1995). The WHO/FDI goal for the year 2000 of a mean DMFT index no more than 3 at the age of 12 years was achieved in this population, and on-going efforts should be made to reduce the percentage of children with caries in order to achieve the WHO/FDI goals for the year 2010.*

Key words *Dental Caries; Oral Health; Community Dentistry; Dentistry*

Resumo *O objetivo deste estudo foi comparar a prevalência de cárie em crianças de sete a 12 anos em Araraquara, São Paulo, Brasil, em 1989 e 1995. Foi utilizada amostragem sistemática para selecionar crianças de escolas públicas. Examinadores treinados realizaram levantamentos epidemiológicos, utilizando o índice CPOD e os critérios de diagnóstico da OMS. Em todas as idades, houve aumento da porcentagem de crianças livres de cárie na dentição permanente (de 29% em 1989 para 51% em 1995). Para crianças aos 12 anos de idade, foram observados índices CPOD de 3,8 em 1989 e de 2,6 em 1995. Detectaram-se também reduções nas porcentagens de crianças classificadas nas seguintes categorias do CPOD: um a três (de 40% em 1989 para 31% em 1995); quatro a seis (de 26,6% em 1989 para 16,5% em 1995) e sete ou mais (de 4,4% em 1989 para 1,5% em 1995). A meta da OMS/FDI para o ano 2000, de que aos 12 anos os indivíduos apresentem em média índice CPOD menor ou igual a três, foi atingida pelos escolares em estudo. Esforços devem ser empreendidos para que haja redução da porcentagem de crianças com experiência de cárie e sejam alcançadas as metas de saúde bucal da OMS/FDI para o ano 2010.*

Palavras-chave *Cárie Dentária; Saúde Bucal; Odontologia Comunitária; Odontologia*

Introduction

Results of epidemiological studies over the last 20-25 years have shown a consistent and similar decline in the prevalence of dental caries in children from many developed countries (Burt, 1994; Downer, 1994; Spencer et al., 1994; Truin et al., 1994; Fehr, 1994). Evidence of an increase in dental caries in children from some developing countries has been shown, according to surveys conducted in different countries and published by the WHO Global Oral Data Bank (WHO, 1993).

Data from the national epidemiological survey carried out in Brazil in 1986 (MS, 1988) showed a high prevalence of dental caries in children and adolescents, with a DMFT (mean number of permanent teeth that were decayed, missing due to caries, or filled) value of 6.6 at the age of 12 years.

Available data from the last national survey in Brazil, in 1996, showed a dramatic decline in prevalence of dental caries in the five regions of the country. In the Southeast region, a DMFT of 2.1 was observed at the age of 12 (MS, 1997).

In Araraquara, State of São Paulo, a decrease in the prevalence of caries has been observed since 1989 (Dini & Silva, 1994; Dini et al., 1996). In 1989 a DMFT value of 3.8 was observed in 12-year-old children, and only 5.3 percent were free of caries. In that same year an urban school-based dental health prevention/treatment program targeting 7-12-year-olds was implemented.

The importance of monitoring trends in prevalence and distribution of dental caries over time is evident. It is useful in planning services, setting local and national targets, and determining whether progress has been made towards goals or strategies.

The purpose of this paper is to report on the prevalence of caries in 7-12-year-old schoolchildren enrolled in the urban public schools in 1995 and to compare it with the 1989 prevalence data.

Material and methods

The study population consisted of 14,732 7-12-year-old schoolchildren enrolled in all urban public schools (34) in Araraquara, São Paulo, Brazil, in 1995.

The sample size was defined according to Silva (1968). The level of significance was established at 5 percent and the level of precision at 0.4 (WHO, 1987). The variances used were those obtained in the 1989 epidemiological den-

tal survey carried out in the student population in Araraquara (Dini et al., 1996). From the class lists of the 34 urban public schools, previously ordered by age and using a systematic random sampling procedure (Kahn & Sempos, 1989), 947 children aged 7-12 years were selected.

Clinical examinations were carried out in the dental chairs of the schools using artificial lighting, by two examiners (ELD; IMGB), who had been trained previously using the DMFT index and the WHO diagnostic criteria (WHO, 1987).

Examinations were conducted as in the 1989 survey and calibration exercises were carried out in a local urban public school before the dental examinations (Neves et al., 1997). Prevalence data from this survey were compared with those obtained in the 1989 survey. Details of the methodology and results of the 1989 survey have been published previously (Vasconcellos & Silva, 1992; Dini & Silva, 1994; Dini et al., 1996).

Results

Table 1 shows mean DMFT and percent differences between the 1989 and 1995 surveys, according to age. In all ages, mean DMFT values showed a decline over the 6-year period, ranging from 0.2 in 7-year-old children to 1.4 for 11-year-olds. Amongst 12-year-olds, the mean DMFT value was 3.8 in 1989 and 2.6 in 1995. Table 2 shows the percentage of the DMFT components according to survey year and age. Except for 7- and 12-year-old children, an increase ranging from 2.3 percent in 9-year-olds to 7.6 percent in 11-year-old children was observed in the proportion of filled permanent teeth (care index) in all other ages over the 6-year period.

Table 3 provides the percentage of children according to DMFT index categories, survey year, and age. In all ages there was an increase in the percentage of children free of caries in the permanent dentition (from 29 percent in 1989 to 51 percent in 1995). At the age of 12, the increase in caries-free children was 22 percent (from 5.3 percent in 1989 to 27.2 percent in 1995). Table 3 also shows a decrease in the percentage of children classified in the 1-3, 4-6, and 7 or more DMFT index categories. The greatest decrease observed in the 4-6 DMFT index category was in 10-year-old children (22.5 percent). For those classified in the 7 or more DMFT index category, the greatest decrease was observed in 11-year-old children (9.8 percent in 1989 and 3.0 percent in 1995).

Table 1

Mean DMFT indices in 1989 and 1995 and mean DMFT and percentage differences between the 1989 and 1995 surveys, according to age. Urban public schools, Araraquara, São Paulo, Brazil.

Age	mean DMFT		1989 1995 differences		
	1989	1995	mean	C.I.**	%
7	0.5 (1.0)*	0.3 (0.9)	0.2	(-0.02 - 0.4)	40.0
8	1.2 (1.5)	0.7 (1.3)	0.5	(0.2 - 0.8)	41.7
9	1.8 (1.7)	1.4(1.6)	0.4	(0.1 - 0.7)	22.2
10	2.6 (1.9)	1.4 (1.5)	1.2	(0.8 - 1.5)	46.1
11	3.4 (2.4)	2.0 (1.9)	1.4	(0.9 - 1.9)	41.2
12	3.8 (2.6)	2.6 (2.3)	1.2	(0.7 - 1.7)	31.6

* standard deviation.

** confidence intervals.

Table 2

Percentage of DMFT components, according to survey year and age. Urban public schools, Araraquara, São Paulo, Brazil.

Survey year	Age	n	D (%)	M (%)	F* (%)
1989	7	139	19.1	-	80.9
	8	235	18.1	0.3	81.6
	9	412	16.9	0.5	82.5
	10	158	13.9	1.2	84.9
	11	246	17.1	1.3	81.6
	12	282	14.2	2.0	83.6
1995	7	160	29.1	-	70.9
	8	133	14.3	-	85.7
	9	163	13.8	1.3	84.8
	10	198	8.4	0.7	90.8
	11	135	10.0	0.8	89.2
	12	158	14.3	5.7	80.0

* care index.

Discussion

The survey, conducted in 1995, shows the prevalence of caries in Araraquara, a city with fluoridated water since 1963, and compares the results with those from the 1989 survey. A decrease in caries prevalence was observed over the 6-year period. In all age groups there was an increase in the percentage of children free of caries in the permanent dentition (from 29 percent in 1989 to 51 percent in 1995). The reduction of caries ranged from 31.6 percent among 12-year-olds to 46.1 percent in 10-year-olds.

Estimates of caries levels recorded in the current study for 12-year-old children were similar to those reported for children in the South-

east region of Brazil in the last national survey in 1996 (MS, 1997). However, the latter included children from private schools and belonging to families from higher income, unlike the survey carried out in Araraquara.

Prevalence of caries in 12-year-old children in Araraquara was lower than that observed in a population of the same age in Brazil in 1993 (4.9) (Pinto, 1997), in the State of São Paulo between 1990-1995 (4.8) (Peres et al., 1997) and in the city of Goiânia in 1994 (4.6) (Freire et al., 1997).

Taking into account the design of the present study and even having used the same diagnostic criteria to measure caries in both surveys (1989 and 1995), caution is required

Table 3

Percentage of children according to DMFT index categories, survey year, and age. Urban public schools, Araraquara, São Paulo, Brazil.

Survey year	Age	Percentage of children with DMFT categories			
		0	1-3	4-6	7 or more
1989	7	73.4	23.7	2.9	–
	8	48.1	39.6	11.9	0.4
	9	33.2	45.4	20.9	0.5
	10	17.7	43.7	36.7	1.9
	11	13.0	39.4	37.8	9.8
	12	5.3	39.0	43.3	12.4
	7-12	29.0	40.0	26.6	4.4
1995	7	83.1	13.8	3.1	–
	8	71.4	20.3	8.3	–
	9	50.9	31.9	17.2	–
	10	42.4	43.4	14.2	–
	11	33.3	37.8	25.9	3.0
	12	27.2	35.4	31.0	6.4
	7-12	51.0	31.0	16.5	1.5

in making assumptions regarding possible reasons for the observed reduction in dental caries in this population. At least three factors may have contributed to this finding. First, the school-based dental health prevention/treatment program, which had not been implemented in 1989, providing individual and community preventive procedures, may have contributed to the observed decline in caries. Second, differences may have arisen through the increased exposure of this population to fluoridated toothpaste; since 1988, about 90 percent of the commercially available dentifrices in Brazil have been fluoridated (Cury, 1991). A third reason may be related to changes in treatment philosophy and decision in providing restorative intervention by dentists. Although the proportion of filled teeth (care index) has increased in all age groups, with the exception of 7- and 12-

year-olds, the percentage of children in DMFT categories 1-3, 4-6, and 7 or more showed a marked decrease in all other age groups.

Although 73 percent of 12-year-olds had caries, of whom 37 percent had 4 or more teeth with caries, prevalence of the disease may be regarded as low in WHO terms, and the goal for the year 2000 of a mean DMFT index of no more than 3 at the age of 12 (FDI/WHO, 1982) was achieved in this population.

The results suggest that maintenance of the present school-based program, added to new efforts like training dentists in diagnosis and treatment using alternative dental materials such as sealants and glass ionomers, would help further reduce the prevalence of dental caries in this population group, with the aim of achieving the WHO/FDI goals for the year 2010 (WCPD, 1993).

Acknowledgments

Fundação para o Desenvolvimento da Universidade Estadual Paulista (FUNDUNESP).

References

- BURT, B., 1994. Trends in caries prevalence in North American children. *International Dental Journal*, 44:403-413.
- CURY, J. A., 1991. Fluorterapia. *Biblioteca Científica da ABOPREV*, 4:1-6.
- DINI, E. L. & SILVA, S. R. C., 1994. Prevalence of caries and dental care status of schoolchildren from urban and rural areas in Araraquara, SP, Brazil. *International Dental Journal*, 44:613-616.
- DINI, E. L.; FOSCHINI, A. L. R.; MENDONÇA, F. C. C.; NARDO, G.; ABBADE, M. T. G. & FRAIS, R. L. M. S., 1996. Changes in dental caries prevalence of schoolchildren in Araraquara, SP, Brazil. *International Dental Journal*, 46:82-85.
- DOWNER, M. C., 1994. Caries prevalence in the United Kingdom. *International Dental Journal*, 44:365-370.
- Fédération Dentaire Internationale (FDI), 1982. Global goals for oral health in the year 2000. *International Dental Journal*, 32:74-77.
- FEHR, F. R. von der, 1994. Caries prevalence in the Nordic countries. *International Dental Journal*, 44:371-378.
- FREIRE, M. C. M.; PEREIRA, M. F.; BATISTA, S. M. O.; BORGES, M. R. S.; BARBOSA, M. I. & ROSA, A. G. F., 1997. Prevalência de cárie e necessidades de tratamento em escolares de seis a doze anos de idade, Goiânia, GO, Brasil, 1994. *Revista de Saúde Pública*, 31:44-52.
- KAHN, H. A. & SEMPOS, C. T., 1989. *Statistical Methods in Epidemiology*. New York: Oxford University Press.
- MS (Ministério da Saúde), 1988. *Levantamento Epidemiológico em Saúde Bucal. Brasil, Zona Urbana, 1986*. Brasília: Centro de Documentação do Ministério da Saúde.
- MS (Ministério da Saúde), 1997. Levantamento epidemiológico. Redução do índice CPOD chega a quase 54% em relação a 1986. *CFO Informa*, 6:3.
- NEVES, L. H. M.; DINI, E. L. & BRANDÃO, I. M. G., 1997. Kappa statistics applied to evaluate the intra- and interexaminers agreement. *Journal of Dental Research (Divisional Abstracts)*, 76:965.
- PERES, M. A. A.; NARVAI, P. C. & CALVO, M. C., 1997. Prevalência de cárie dentária em crianças aos doze anos de idade, em localidades do Estado de São Paulo, Brasil, período 1990-1995. *Revista de Saúde Pública*, 31:594-600.
- PINTO, V. G., 1997. Epidemiologia das doenças bucais no Brasil. In: *Promoção de Saúde Bucal* (L. Kriger, coord.), pp. 27-41, São Paulo: Artes Médicas Ltda.
- SILVA, E. P. C., 1968. *Amostragem*. São Paulo: Faculdade de Saúde Pública, Universidade de São Paulo.
- SPENCER, A. J.; DAVIES, M.; SLADE, G. & BRENNAN, D., 1994. Caries prevalence in Australasia. *International Dental Journal*, 44:415-423.
- TRUIN, G. J.; KÖNIG, K. G. & BRONKHORST, E. M., 1994. Caries prevalence in Belgium and The Netherlands. *International Dental Journal*, 44:379-385.
- VASCONCELLOS, M. C. C. & SILVA, S. R. C., 1992. Distribuição de cárie dentária na dentição permanente de escolares, em Araraquara, SP. *Revista de Odontologia da Universidade de São Paulo*, 6:61-65.
- WCPD (World Congress on Preventive Dentistry), 1993. World Congress on Preventive Dentistry, 4th, Umea, Sweden, 1993. *Jornal da ABOPREV*, 4:5.
- WHO (World Health Organization), 1987. *Oral Health Surveys: Basic Methods*. Geneva: WHO.
- WHO (World Health Organization), 1993. *Dental Caries Levels at 12 Years*. WHO/ORH (Oral Health)/EIS (Epidemiological Information System)/12-year-old book. Geneva: WHO.