Dental Caries of Lifetime Residents in Baixo Guandu, Brazil, Fluoridated since 1953 – A Brief Communication

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Abstract

Objectives: *This study aimed to verify the dental caries prevalence in Baixo Guandu, the first Brazilian city to fluoridate its public water supplies; to compare the findings with the data from the national survey; and also to compare the prevalence in the 12-year-old age group with the data obtained before the beginning of the fluoridation.* ***Methods:*** *All the lifetime residents aged 5, 12, 15 to 19, and 35 to 44 years old were clinically examined (World Health Organization).* ***Results:*** *The means of dmft/DMFT were lower than in the Brazilian population living in fluoridated communities. The DMFT Index in 12-year-old residents decreased between 1953 and 2005 from 8.61 to 1.55.* ***Conclusions:*** *The addition of fluoride to public water supplies was an important ally in the improvement of the oral health of Baixo Guandu inhabitants.*

Key Words: fluoride, water fluoridation, oral health, dental caries, dental public health

Introduction

Public water fluoridation has been described as one of the 10 most important public health advances of the 20th century and as one of the major factors responsible for the decrease in dental caries prevalence (1-3).

In Brazil, the first fluoridation scheme was implemented in 1953, in Baixo Guandu, Espírito Santo (4,5), and in 1974, the Brazilian government approved a federal law making fluoridation of drinking water mandatory wherever a public water treatment station existed (6).

Baixo Guandu is located in Espírito Santo State, southeast region of Brazil. There were about 4,000 inhabitants in 1953 and 20,000 in 2005. Initially, the optimal level was 0.8 mgF/L controlled by the Municipal Water Department. Now, it is 0.7 mgF/L monitored by the Health Department of Espírito Santo State.

Other sources of fluoride available are the dentifrices, topical applications carried out by dentists in private offices, and the content of the foods consumed. These factors make it difficult to evaluate the isolated effect of water fluoridation (7).

This study aimed to verify the dental caries prevalence in lifetime residents of Baixo Guandu, Brazil, aged 5, 12, 15 to 19, and 35 to 44 years old; to compare these findings with the data from the national survey, for which residence status is unknown (8); and also to compare the data from the 12-year-old age group with the data obtained before the beginning of the water fluoridation.

Methods

After the approval of the São Paulo State University Ethics Committee, health agents were trained to identify all lifetime residents of urban areas of Baixo Guandu aged 5, 12, 15 to 19, and 35 to 44 years old based on three criteria: consumed exclusively the water distributed by the City Water Department; had not spent more than 30 days/year away from the city; and did not use fluoride solutions. One examiner and one notetaker were trained and calibrated (intra-examiner kappa = 0.95) through the clinical examination of subjects in the same age groups living in another city.

All the subjects signed an informed consent form. Clinical examinations were carried out in the participants' domiciles, under natural light, using a mouth mirror and a World Health Organization (WHO) probe with the criteria and codes suggested by the WHO (9). In each age group, 10 percent of the subjects were reexamined to check the results.

The results were processed by the Epibuco Program (Lopes, Bauru, São Paulo, Brazil; Microsoft Visual FoxPro), and the dmft/DMFT indices were compared to those of the national survey (8) and of other studies previously conducted in the same town (5). Epi-info 3.2 Program (Centers for Disease Control and Prevention, Atlanta, GA, USA) was used for the statistical analysis, which included odds ratio (OR) and 95 percent confidence interval (CI) for the difference between the 12-year-old children from Baixo Guandu examined in 1953 and 2005.

Results

The dmft/DMFTs for the 656 examined participants means are shown in Table 1. In all age groups, the means of dmft/DMFT were lower in the lifetime residents of Baixo Guandu than in the Brazilian population living in fluoridated

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Table 1
Number (*n*), Mean dmft/DMFT, Caries-Free Percent, and Mean Number of Sound Teeth of the Subjects Examined in the 2005 Study and in the National Survey

Age (years)	Site	Fluoride	*n*	dmft (*) DMFT	Percent of Caries-Free	Mean Number of Sound Teeth
5	Brazil†	No	11,355	3.36*	33.1	15.6
		Yes	15,286	2.38*	46.2	16.7
	Baixo Guandu	Yes	141	2.32*	44.0	16.0
12	Brazil†	No	16,029	3.38	23.6	22.4
		Yes	18,521	2.27	37.5	23.0
	Baixo Guandu	Yes	111	1.55	46.8	25.7
15-19	Brazil†	No	9,371	6.56	11.1	22.1
		Yes	7,462	5.69	13.6	22.5
	Baixo Guandu	Yes	270	3.48	21.8	25.1
35-44	Brazil†	No	6,959	20.12	0.6	11.1
		Yes	6,472	20.14	0.4	10.5
	Baixo Guandu	Yes	134	13.85	3.0	17.4

* dmft, decayed, missing, or filled primary teeth.
† National survey 2002-03 (8).

Table 2
DMFT of Lifetime Resident Children of Baixo Guandu before and after 10 Years of Water Fluoridation

Age (years)	DMFT 1953	DMFT 1963	% Reduction in DMFT 1953-63
6	2.46	0.48	80.5
7	3.17	0.81	74.4
8	3.86	1.52	60.6
9	4.55	1.86	59.1
10	6.29	2.11	68.0
11	6.71	3.01	55.1
12	8.61	3.69	57.1
13	9.41	4.58	51.3
14	11.02	4.90	55.5

Source: Pinto (5).

communities. In the age groups of 12-, 15- to 19-, and 35- to 44-year-olds, the DMFT means of Baixo Guandu inhabitants were 31.7, 38.8, and 31.2 percent lower, respectively.

Surveys conducted before and after 10 years of the initiation of water fluoridation in Baixo Guandu testified caries reduction, as shown in Table 2. In 52 years, the DMFT Index in 12-year-old lifetime residents of Baixo Guandu decreased by 82.0 percent, from 8.61 (Table 2) to 1.55 (Table 1). From the 101 12-year-old children examined in 1953, only two were caries-free. In 2005, from 111 12-year-old children, 52 were caries-free (OR = 43.6; 95 percent CI = 10.2 to 185.7).

Discussion

Although the current Brazilian legislation mandates water fluoridation (6), in many municipalities, it has not been implemented yet, or it was not determined how to guarantee the adequate content (4,10). Even so, a significant reduction in dental caries prevalence, mostly attributed to water fluoridation, expansion of preventive programs, and the use of fluoride dentifrices (3), has been confirmed (3,8).

The methodology of this study does not allow us to affirm that only water fluoridation was responsible for the DMFT Index reduction. However, the DMFT Index of the 35- to 44-year-old inhabitants (13.85) is much lower than the same index in other fluoridated Brazilian cities (20.14). Many of those cities began the water fluoridation at the end of the decade of 1980 (8), and Baixo Guandu residents have drunk fluoridated water since their birth. Furthermore, the popularization of the use of fluoride dentifrices in Brazil occurred in the decade of 1990 when the 35- to 44-year-old age group was more than 20 years old. One might say that a lot of this difference is because of the fluoride added to the water.

It is important to add that in the age groups of 12- and 15- to 19-year-olds, who have been born after the initiation of fluoridation, a difference between the DMFT of Baixo Guandu inhabitants and the inhabitants of other fluoridated communities was found, which might be explained by the fact that the national survey is a sample of all inhabitants and not just lifetime residents. Besides that, many Brazilian cities did not establish ways to guarantee the content of fluoride.

In conclusion, the dental caries prevalence of the lifetime residents of Baixo Guandu is lower than the rest of the Brazilian population. The addition of fluoride to public water supplies was an important ally in the improvement of oral health.

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