

**Original**

## Factors associated with prevalence of dental caries in Brazilian schoolchildren residing in Japan

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(Received 8 January and accepted 7 June 2011)

**Abstract:** Brazilian immigrants comprise the third largest ethnic group within the Japanese population. The aim of this cross-sectional study was to determine the factors associated with the prevalence of dental caries in Brazilian schoolchildren living in Japan. A total of 378 schoolchildren, aged between 6 and 14 years, attending Brazilian schools in Japan were included. Clinical data were collected according to World Health Organization criteria. Socioeconomic data, oral health behavior and diet information were collected through questionnaires. The correlation between associated factors and dental caries prevalence was analyzed using chi-square test and multiple logistic regression analysis. The percentage of caries-free schoolchildren was 61.90% and the mean DMFT was  $1.28 \pm 2.22$  (mean  $\pm$  SD). The mother's educational level and previous access to dental care services in Brazil were strongly associated with caries experience ( $P < 0.05$ ). This study indicated that these variables are risk factors associated with caries experience in a community of Brazilian schoolchildren residing in Japan. (J Oral Sci 53, 307-312, 2011)

Keywords: dental caries; Brazilian schoolchildren; risk factors; oral health; Japan.

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### Introduction

There has been mass immigration, mainly of people from Asian and South American countries, to Japan and the number of immigrants has increased in the last decades (1). People from Brazil began to immigrate to Japan in the late 1980s due to the economic instability in Brazil, which forced them to seek jobs and better lifestyles. Brazilians comprise the third largest ethnic group in Japan, with a population of nearly 280,000 (2). Most of the Brazilians residing in Japan came with their families and work in factories. Due to cultural differences, lack of communication and language difficulties, a majority of the Brazilian parents prefer to send their children to Brazilian schools rather than Japanese ones.

Dental caries remain as an important oral problem in many communities, particularly among underprivileged groups in developed and developing countries. Several studies have reported that culture and age cohort, as well as language and economic limitations, act as barriers to an ethnic minority obtaining dental care and maintaining good oral health (3,4).

The focus on non-biological determinants of dental caries is important, because for too many years the concept of causation of caries has been restricted to biological processes (5). According to Petersen (6), sociobehavioral and environmental factors play an important role in oral disease and health, and this has been demonstrated

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in several reports. The social, economic, political and cultural determinants of health are considered to be significant, and better health can be achieved by reducing poverty.

In the literature, the prevalence of dental caries has been associated with many factors, such as low socioeconomic status, restricted access to dental services, sugar consumption and parents' instruction (7,8). Köhler and Holst (9) estimated the relative effect of dental health factors on caries prevalence in children with dental caries. The dental health conditions were significantly associated with few independent variables – namely, toothbrushing frequency, intake of fluoride tablets, and regular dental appointments.

However, no data have been reported regarding this association in Brazilian immigrants residing in Japan. Therefore, the aim of the present study was to determine the factors associated with prevalence of dental caries in 6- to 14-year-old Brazilian schoolchildren living in Japan.

## Materials and Methods

### Subjects

A cross-sectional study was conducted in five Japanese cities, Hamamatsu, Yaizu, Anjo, Kamisato and Kani, located in the North Kanto and Tokai regions, where Brazilian immigrants have settled in large numbers. Five schools, one in each city, were randomly selected for the study. The number of students, proportion of children by age and socioeconomic status of the students were similar in the selected schools. A letter was sent to the parents of all children explaining the aims, characteristics and significance of the study and asking for their participation. Of a total of 400 schoolchildren, 378 participated in the study (94.5% response rate), with 187 boys (49.5 %) and 191 girls (50.5%). The average age was  $9.83 \pm 2.65$  years (Table 1). Half of the non-responders ( $n = 11$ ) had

refused to take part in the study and the other half ( $n = 11$ ) did not appear for clinical examination.

### Clinical examination

Informed consent to examine the children was obtained from their parents on the understanding that no child would be examined against his or her will. The clinical examination was performed by a single calibrated examiner (LNH) with the subjects seated in a chair inside the classroom. No radiographic examination was performed. Diagnosis of caries was based on the detection of carious lesions in the cavitation stage, in accordance with the criteria recommended by WHO (10) and graded with the decayed (D), missing (M), and filled (F) teeth (T) index. Caries diagnosis was based on visual-tactile criteria using a sterile mirror top connected to an artificial light (Oral Light Mirror®, Osada Co., Tokyo, Japan) and a blunt dental probe.

### Questionnaire

Non clinical data were collected through a questionnaire provided to the families at the children's school. The questionnaire included information about diet (sugary snacks intake), access to dental services in Brazil and in Japan, parents' schooling level, parental Japanese health insurance, toothbrushing frequency and use of fluoride dentifrice.

### Statistical analysis

The mean number of decayed, missing and filled permanent teeth (DMFT) and percentage of caries-free children (DMFT = 0) were calculated. The associations between categorical variables and prevalence of dental caries were determined using the Chi-square test. Variables with  $p$  values  $\leq 0.05$  under the Chi-square test were included in the multiple logistic regression analysis, using the stepwise forward procedure. Such variables were entered into this model according to their significance under the Chi-square test. Data were analyzed using statistical software (Statistical Package for Social Sciences 10.0 for Windows, Chicago, IL, USA).

## Results

The results of this study showed a mean DMFT of 1.28 (SD = 2.22) and a high percentage of caries-free children (61.90%) in 6- to 14-year-old schoolchildren.

Table 2 shows the association between caries experience of Brazilian schoolchildren residing in Japan and the different factors analyzed. A significant association between caries prevalence and father's health insurance ( $P = 0.01$ ), mother's health insurance ( $P = 0.004$ ), father's

Table 1 Distribution of the study population by age and gender

Age	Gender				Total <i>n</i>
	Female		Male		
	<i>n</i>	%	<i>n</i>	%	
6	24	49.0	25	51.0	49
7	25	55.5	20	44.5	45
8	26	51.0	25	49.0	51
9	18	50.0	18	50.0	36
10	16	47.1	18	52.9	34
11	20	55.6	16	44.4	36
12	21	43.8	27	56.3	48
13	20	51.3	19	48.7	39
14	21	52.5	19	47.5	40
Total	191	50.5	187	49.5	378

schooling level ( $P = 0.01$ ), mother's schooling level ( $P = 0.001$ ), consumption of sweets ( $P = 0.02$ ) and previous access to dental care services in Brazil ( $P = 0.001$ ) was identified using the Chi-square test.

All schoolchildren confirmed the habit of toothbrushing with dentifrice. However, 44.18% children did not know whether their dentifrices contained fluoride.

In Table 3, the risk factors associated with caries experience were analyzed and the odds ratio (OR) and the odds ratio adjusted by gender and age ( $OR_a$ ) were calculated. Father's health insurance and consumption of sweets were no longer significant when non-conditional multiple regression was performed.

The multiple regression analysis (Table 3) showed that children whose mother's schooling level was elementary school (lower than 8 years of study) presented 3.48 (OR

95%CI 1.3-8.9,  $P = 0.001$ ) more chance to have dental caries experience when compared with others whose mother's schooling level was university (over 12 years of study).

Finally, children who did not have previous access to dental care services in Brazil presented 2.69 (OR 95%CI 1.0-6.7,  $P = 0.034$ ) more chance of dental caries experience when compared with the ones who had access to dental care services before coming to Japan (Table 3).

## Discussion

The present study assessed the factors associated with prevalence of dental caries in 6- to 14 year-old Brazilian schoolchildren residing in Japan. The caries prevalence, DMFT index and percentage of caries-free children observed in this population were similar to the

Table 2 Association between caries experience and socioeconomic, diet and behavioral factors in Brazilian schoolchildren residing in Japan ( $n = 378$ )

Variables	Caries experience		$P^{**}$
	no $n$ (%)	yes $n$ (%)	
Father's health insurance*			0.01
	Has	134 (67)	
	Has not	71 (52.6)	
Mother's health insurance			0.004
	Has	147 (65.9)	
	Has not	79 (50.9)	
Father's schooling level*			0.01
	University	36 (70.6)	
	High school	99 (67.3)	
	Elementary school	75 (52.1)	
Mother's schooling level*			0.001
	University	43 (76.8)	
	High school	109 (68.1)	
	Elementary school	62 (46.9)	
Consumption of sweets*			0.02
	< once a day	150 (62.2)	
	once a day	32 (46.4)	
Consumption of carbonated juices			0.08
	< once a day	98 (62.4)	
	once a day	120 (54.3)	
Previous access to dental care services in Brazil*			0.001
	Yes	65 (84.4)	
	No	153 (54.8)	
Frequency of toothbrushing			0.07
	≤ once a day	34 (62.9)	
	twice a day	183 (56.5)	
Use of fluoride dentifrice			0.25
	Yes	95 (66.0)	
	No	41 (61.2)	
	Do not know	96 (57.5)	
Gender			0.83
	Male	117 (62.6)	
	Female	117 (61.2)	
Age***	Mean = 9.83		S.D. = 2.65

\*The total was smaller than the effective sample ( $n = 378$ ) due to missing information; \*\* $P$  values of the Chi-square test; \*\*\*Continuous data.

data reported in Japanese children (11). However, when compared to data of Brazilian children living in Brazil (12), the caries prevalence and DMFT index were lower and the percentage of caries-free children was higher. The results are in agreement with those of a previous study which also observed a low prevalence and severity of dental caries in Brazilian schoolchildren, aged 6 to 12 years old, residing in Japan (13).

Dental caries is a multifactorial disease. The interplay between biological and social risk factors was highlighted in the present study, in which the mother's schooling level and previous access to dental care services in Brazil were associated with dental caries in a population of Brazilian schoolchildren residing in Japan.

The health indicators and socioeconomic status have shown, in general, a directly proportional relationship; the lower the socioeconomic status, worse the health indicators (14). Among the various possibilities for the use of socioeconomic indicators, the level of maternal schooling has been used as one of the best predictors of a child's health, mainly in underdeveloped countries (15). The results of this study indicated that children with lower educational level mothers experienced more caries than children with higher educational level mothers. Our results are in agreement with other previous studies which showed that the degree of schooling of the child's guardian, especially the level of schooling of the mother, appears to be a risk factor for dental caries in children (16-18). More access to information, better understanding of the importance of dental health in daily life and better oral hygiene could explain these findings in a population with more years of study. Other researchers have claimed that evaluation of the educational level may give a more complete picture of the socioeconomic condition, since

individuals with greater educational level have better work conditions, greater income and access to health care (19).

Another factor which was found to be associated with dental caries in the present study population was previous access to dental care services in Brazil. Some studies carried out in Brazil agree with our results showing a correlation between higher educational levels, access to dental services and dental caries. Baldani et al. (20) investigated the associations between dental caries, socioeconomic indicators and supply of dental services. They suggested that the indicators of income inequality were significantly associated with dental caries, demonstrating that the worst oral health conditions cannot be dissociated from income disparities (20). Results of another Brazilian study showed that the fact of having a regular source of dental care was identified as a protective factor in the analysis for self-reported oral health diseases and tooth loss in a Brazilian elderly community (21). In Brazilian schools located in Japan, there are no periodic dental check-ups for schoolchildren, unlike the situation in Japanese schools. This Brazilian community, isolated from the Japanese system, experiences cultural isolation, lack of communication and language difficulties when attempting to deal with the mainstream Japanese health and welfare systems (13). Therefore, even if their parents have Japanese health insurance, the children may not be benefiting from the health system.

Literature regarding the correlation between sugar consumption and dental caries is inconclusive. Some reported that changes in sugar consumption are currently responsible for social inequalities in dental caries prevalence. Reduction of caries prevalence may be related to distinct dental health factors, such as use of fluoride

Table 3 Risk factors associated with caries experience in Brazilian schoolchildren residing in Japan

Variable	OR (IC 95% OR)	P	OR <sub>a</sub> (IC 95% OR <sub>a</sub> )	P
Mother's schooling level				
University	1	0.001	1	–
High school	1.55 (0.77; 3.13)		2.11 (0.8; 5.3)	0.11
Elementary school	3.73 (1.84; 7.58)		3.48 (1.3; 8.9)	0.001
Father's health insurance				
Has	1	0.009	1	0.3
Has not	1.83 (1.14; 2.94)		0.72 (0.3; 1.3)	
Consumption of sweets				
< once a day	1	0.02	1	0.81
≥ once a day	1.01 (1.07; 3.39)		1.09 (0.5; 2.3)	
Previous access to dental care services in Brazil				
Yes	1	0.001	1	0.034
No	4.46 (2.22; 9.13)		2.69 (1.0; 6.7)	

OR = odds ratio; OR<sub>a</sub> = odds ratio adjusted by gender and age.

dentifrice, frequency of toothbrushing, and access to dental care services (22,23). Others authors suggest that a sugary diet still represents a dominant caries risk factor (24) because fluoride use is not widespread among immigrant and ethnic groups whose dental knowledge is often poor. The pattern of use of sugar has also changed in recent years, from consumption of pure sugar to an increased intake of sweets and chocolates (25,26). In this study, consumption of sugary snacks and beverages (sweets and carbonated sweet beverages) was not associated with dental caries.

Scientists worldwide agree on the importance of regular use of fluoride to control dental caries (27). Brazilian schoolchildren residing in Japan do not have access to fluoridated water supply nor dietary fluoride supplements, because systemic fluorides are not used domestically (28). However, they can access fluoride from dentifrices. The most consumed dentifrices in the Japanese market have an available and stable amount of fluoride adequate to control dental caries (29). In the present study, the use of a fluoride dentifrice did not differ with the socioeconomic status of the schoolchildren, corresponding to the high market share of sales of fluoride toothpaste in Japan (29). The results of this study also showed that the toothpaste brand most frequently used by Brazilian schoolchildren was fluoridated, although 44.18% of the schoolchildren were not aware whether their toothpaste was fluoridated.

In conclusion, the results of this study indicated that Brazilian schoolchildren residing in Japan had low caries prevalence, and there was a high percentage of caries-free individuals. Social factors such as the mother's educational level and access to dental care services in Brazil were risk indicators for caries in the permanent dentition for the entire sample. Moreover, the data from this study corroborate available information regarding Brazilian immigrants and would be of great importance for evaluating, monitoring and planning oral health activities. The relationship is of such strength that these risk factors deserve to be taken into account in future preventive dental strategies.

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