ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Oral health status of the ethnic group Xukuru from Ororubá: multilevel analysis

Condições de saúde bucal da etnia Xukuru do Ororubá em Pernambuco: análise multinível

Herika de Arruda Mauricio[I], Rafael da Silveira Moreira[I]

ABSTRACT: *Objective*: To analyse the oral health status of the indigenous people Xukuru from Ororubá aged 10 to 14 years old, in Pernambuco, Brazil. *Method*: A cross-sectional population-based study developed within the limits of the Indigenous Land Xukuru, from January to March 2010. Oral examinations were performed on a sample of 233 indigenous people. The software SPSS 13.0® was used for descriptive analysis. Later, in order to measure the effect of factors associated with the absence of caries, Poisson log-linear multilevel models were tested with the statistical software MLwiN 2.02®. *Results*: Oral examinations identified a DMFT Index average of 2.38 ($\pm$ 2.62). Among all individuals examined, 26.61% were caries free. Multiple regression analysis revealed a negative association between the absence of caries and the variables: higher average of people per household in the villages, higher number of residents per household, older age, male sex, not knowing how to read and write, and very dissatisfied/dissatisfied with teeth/mouth. The variables higher income *per capita*, not sleeping due to dental problems, had never been to the dentist, no occurrence of toothache, and no need for dental treatment were positively associated with the absence of caries. *Conclusion*: The absence of caries is associated with contextual and individual factors of the indigenous people Xukuru from Ororubá, aged 10 to 14 years old.

Keywords: Indians, South American. Health of indigenous peoples. Oral health. Dental health surveys. DMF Index. Multilevel analysis.

[I]Research Center Aggeu Magalhães, Fundação Oswaldo Cruz, Ministry of Health – Recife (PE), Brazil.
Corresponding author: Herika de Arruda Mauricio. Rua Padre Carapuceiro, 273, apartamento 22, Boa Viagem, CEP: 51020-280, Recife, PE, Brasil. E-mail: herikamauricio@yahoo.com.br

RESUMO: *Objetivo:* Analisar a condição de saúde bucal do povo indígena Xukuru do Ororubá na faixa etária de 10 a 14 anos, de Pernambuco, Brasil. *Método:* Estudo de corte transversal de base populacional desenvolvido nos limites da Terra Indígena Xukuru no período de janeiro a março de 2010. Foram realizados exames bucais em uma amostra de 233 indígenas. Utilizou-se o programa estatístico SPSS 13.0® para análise descritiva dos dados. Posteriormente, para medir o efeito dos fatores associados à ausência de cárie, foram testados modelos log-lineares de Poisson multiníveis com o auxílio do programa estatístico MLwiN 2.02®. *Resultados:* Através dos exames bucais foi identificado índice CPO-D médio de 2,38 (±2,62). Entre todos os indivíduos examinados, 26,61% apresentaram-se livres de cárie. A análise múltipla revelou associação negativa da ausência de cárie com as variáveis: maior média de habitantes por domicílio nas aldeias, maior número de moradores por domicílio, maior idade, sexo masculino, não saber ler e escrever e muito insatisfeito/insatisfeito com os dentes/boca. Já as variáveis maior renda *per capita*, não deixar de dormir devido a problemas bucais, nunca ter ido ao dentista, não ocorrência de dor de dente e não necessitar de tratamento odontológico apresentaram associação positiva com a ausência de cárie. *Conclusão:* A ausência de cárie está associada a aspectos contextuais e individuais do povo indígena Xukuru do Ororubá na faixa etária de 10 a 14 anos.

Palavras-chave: Índios sul-americanos. Saúde de populações indígenas. Saúde Bucal. Inquéritos de Saúde Bucal. Índice CPO. Análise multinível.

INTRODUCTION

Epidemiological surveys on oral health allow knowing the prevalence of the main oral diseases, as well as assessing oral health programs, estimates of need for treatment and supply of subsidies to plan for health services[1].

Epidemiological surveys prove that most industrialized countries experiences reduction in the phenomenon of caries in permanent teeth[2,3]. From 1980 to 2003, the reduction observed in the DMFT Index in Brazil, among 12 year-old people, was of 61.7%[4]. From 2003 to 2010, the reduction was of 26.2%[5].

The increasing supply of fluoridated water, the introduction and the fast growth in the market of fluoridated dentifrice, and the decentralization of the Brazilian health system with the expansion of prevention programs are some of the hypotheses that can explain this phenomenon[6].

However, it is not possible to state that the reduced prevalence of caries should also occur among Brazilian indigenous peoples. Nationwide epidemiological surveys conducted in 1986, 1996, 2003 and 2010 are some of the surveillance instruments for oral health in the Brazilian population used by the Ministry of Health[5,7-9]. However, the samples used in these surveys aimed at representing the analyzed age groups, but not the variable race/color, so it is not possible to find the scenario of indigenous oral health in the reports.

The first studies approaching indigenous oral health date back to the 1960s, showing reduced prevalence of caries in Brazilian indigenous communities that had little experience of contact with nonindigenous people[10]. Higher levels were verified in ethnicities who kept permanent contact with the national society[11].

Also in the 1960s, it was possible to observe increasing incidence of caries, and the determining factor was the change in dietary habits, with more availability of fermentable carbohydrates in the diet[12]. In spite of that, it has been known of indigenous peoples with traditional dietary habits that are highly cariogenic[13,14].

Nowadays, some indigenous groups have high level of caries, and others present with low levels, which configures a diverse and complex epidemiological picture[15]. However, the lack of studies approaching oral health among indigenous peoples prevents us from designing an epidemiological profile[12].

In 2010, the Brazilian indigenous population counted on 817,963 individuals distributed in 305 ethnicities and speaking 274 different languages, according to the results from the Demographic Census 2010[16].

In order to know the oral health conditions of Brazilian indigenous peoples, especially in Pernambuco, in the Northeast region, an epidemiological survey was conducted with the people Xukuru, from Orobubá.

Despite constituting the largest indigenous population contingent in Pernambuco[16], this is the first oral health epidemiological survey conducted with this ethnicity. Its objective was to analyze factors associated with the absence of caries in the indigenous people Xukuru, from Ororubá, in the age group of 10 to 14 years old, in Pesqueira, Pernambuco.

METHODS

STUDY POPULATION

The population in the village of the ethnical group Xukuru, from Ororubá, is comprised of 7,225 people living in 1,896 households. The indigenous territory of 27,550 hectares divided in three socioenvironmental regions (Serra, Ribeira and Agreste) and 25 villages, located 216 km from the capital of the State of Pernambuco, in the city of Pesqueira, Northeast Brazil (Figure 1).

The socioenvironmental regions are spatial categories established by ethnicity based on geo-climatic and socioeconomic characteristics. The Agreste region is a mountainous and arid area; the Serra region is characterized for being a fertile region, with natural water reservoirs; and Ribeira has arid land and is inserted in the hydrographic basin of the Ipojuca river[17].

Despite knowing a few words of its native language, the Xukuru people use Portuguese on a daily basis. Its political representatives are the chief, the shaman and the leaderships of the villages, who work on councils, associations and local assemblies. Their relationship
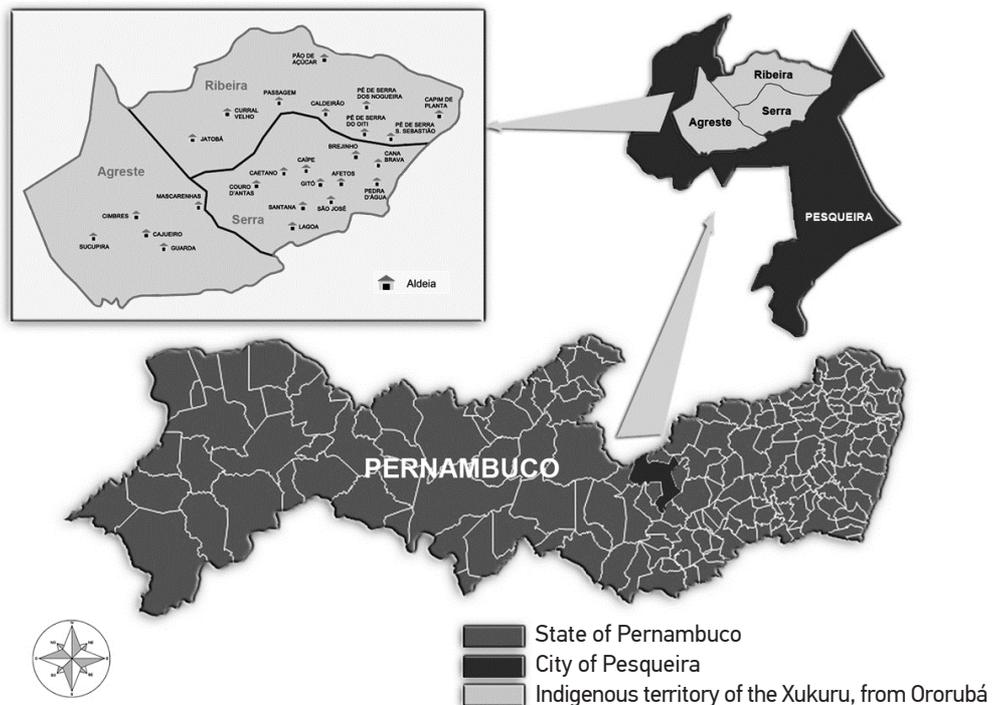
Figure 1. Geographic location of the indigenous territory Xukuru, from Ororubá, and its division according to socioenvironmental regions and villages. Pernambuco, 2010.

with nature is represented in sacred rituals, which aim at transmitting and strengthening their culture[18].

Demographic data were obtained from the study "Analysis of Life, Health and Vulnerability conditions of the Indigenous People Xukuru, from Ororubá, as an Instrument for Primary Health Care Actions", which conducted a participative sociodemographic census in the indigenous territory Xukuru. Its participative aspect is owed to the involvement of the ethnicity in the process of data collection, carried out in January and February, 2010. The collection allowed the construction of a data base referring to socioeconomic, demographic, and migratory aspects, as well as those concerning forms of production and production processes in the population universe living in the territory.

Afterwards, in March 2010, a household health survey called "Health and Life Conditions of the Indigenous People Xukuru, from Ororubá, Pesqueira – PE" was conducted and investigated features related to oral health, nutrition and alcohol consumption, so this study is part of that analysis.

The calculated sample to represent the 871 Xukuru individuals who compose the age group from 10 to 14 years old, assuming a 20% prevalence for caries, 5% accuracy and 95% confidence interval (95%CI) was of 192 subjects. By adding 20% to compensate for losses

and refusals, we reached the number of 231 individuals. Nonetheless, in order to go through the households and obtain representativeness for all of the groups studied in the health survey, the sample strategy was also based on the anemia outcome among children aged less than 5 years old (one of the situations analyzed in the survey), as a reference for the fact that ensuring representativeness of the youngest age group in the study, with the lowest prevalence to be estimated, would allow a significant representation of the other analyzed age groups. In order to reach this group, the need to visit one third of the households of the territory was established.

Therefore, 632 households were raffled, and all of the inhabitants of these households in the age group from 10 to 14 years old were included in the oral health sample. At the end, the sample was composed of 233 individuals, thus ensuring the representativeness of the sampling plan for the caries prevalence outcome.

The selection of households to compose the sample was random and systematic, based on Census questionnaires. The reference were the numbers of the questionnaires, accounting to 5; the 2 first ones referred to the identification of the village (1 to 25), and the other 3 concerned the number of the household in each village (starting with 001). The following calculation was used: k = N (population) / n (sample) = 1896 / 632 = 3.

Therefore, the initial sampling unit was selected by raffling between 1 and k, that is, between numbers one, two and three. After number three was raffled, household selection began. For every three households, the third one was selected.

In case the person living in the household was absent at the time of the visit, two other visits were conducted by the team. If it was not possible to find the person, this inhabitant was computed as a loss. The refusal to participate in the oral examination was of 1.27%. Even though there was no replacement in the sample, its representativeness was maintained.

DATA COLLECTION

Oral examinations demand the maintenance of good reproducibility of observations. Diagnostic divergence may occur between different examiners (interexaminer error), or between different examinations of the same examiner throughout time (intra-examiner error)[19].

In order to avoid divergence, calibration training was carried out in order to establish uniform patterns for the oral examination[20]. The manual SBBrasil 2010[21], national epidemiological survey conducted by the Ministry of Health, guided the theoretical and practical training that involved the whole field team, comprised of 17 people, being 8 examiners and 8 annotators, distributed in 8 work pairs, and oriented by a field coordinator. Throughout data collection, all of the examiners performed intra-examiner agreement, and reexamined 5% of their sample. The level of agreement of the training and of data collection were calculated by using the Kappa coefficient (k).

Oral examinations were conducted based on diagnostic and biosafety criteria established by the World Health Organization (WHO) manual[1]. After the examination, those in charge of the participants, who authorized and accompanied the whole procedure, answered the questionnaire that was adapted from the Epidemiological Survey SBBrasil 2010[21], aiming at characterizing the analyzed sample as to the oral health-disease process.

DATA PROCESSING AND ANALYSIS

The collected data were structured with the software Epi-Info, version 3.4 (2007) and descriptive statistics was conducted with the software SPSS 13.0®. Analytic statistics was performed by the transformation of the DMFT Index, dependent variable, which was collected by the oral examination, in two categories: DMFT Index equals zero (1) and DMFT Index equals to or higher than one (0). Independent variables were collected through questionnaires applied by the Census and by the health survey.

Variables were inserted in the statistical software MLwiN 2.02®, at different levels, according to the hierarchical model[22] developed to guide the analysis. The model was established according to its proximity relationship with the analyzed outcome, at six levels: contextual variables grouped by village characteristics, associated with block 1 (distal); household contextual variables associated with block 2 (intermediate); individual sociodemographic variables associated with block 3 (intermediate); individual self-perception variables and impacts on oral health, block 4 (intermediate); individual variables of use of dental services, block 5 (intermediate); and individual variables of reported oral morbidity, block 6 (proximal).

In order to analyze the outcome DMFT Index equals zero, multivariate linear regression models were used. At first, the univariate analysis of all levels was carried out, beginning with the distal level. The stepwise forward selection procedure was used inside each hierarchical model, that is, the model was initiated by the variable that presented more statistical significance, and, afterwards, the other variables were added, one by one, manually, by decreasing order of statistical significance. Variables that presented $p < 0.25$ were maintained and tested in multiple models. The multiple analysis also began with the same method, and, in the final model of each level there were only those variables in which $p < 0,05$. The variables that remained in each level were considered as adjustment factors for subsequent blocks.

In order to identify factors associated with the absence of caries, effect measurements were calculated by crude and adjusted prevalence ratio (PR), with respective 95%CI, estimated by the Poisson log-linear simple and multiple regression models, with robust variance estimators. Even though Poisson regression models are usually used for counting variables, Barros and Hirakata[23] demonstrated the use of such models as an alternative to logistic regression for cross-sectional studies with dichotomous outcomes.

PR estimates were generated by the statistical software MLwiN 2.02©. The estimation process was the IGLS (Iterative Generalised Least Squares), by using the first order Marginal

Quasi-Likelihood – MQL procedure. The statistical significance of each variable in the model (p-value) was estimated by the Wald test.

ETHICAL ASPECTS

The study was approved by the Research Ethics Committee of the Research Center Aggeu Magalhães (CPqAM), and by the National Research Ethics Commission (CONEP), since it involved indigenous populations (Report n. 34/2011). Besides, it was approved by the National Health Foundation (FUNASA) and by the ethnicity Xukuru, from Ororubá, so there was no conflict of interest.

RESULTS

The oral health work sample with the population aged from 10 to 14 years old was constituted of 173 households and 233 individuals, being characterized mostly by male participants (51.93%), who can read and write (84.12%), most of them study (94.42%) and attend elementary school (90.99%).

The Kappa coefficient was calculated for interexaminer agreement during calibration training, and its average was 0.83. In the intra-examiner agreement, throughout data collection, the mean of the Kappa coefficient was of 0.98.

Concerning the results of the DMFT Index, Table 1 shows that the index presented a 2.38 average, however, with large dispersion (standard deviation ±2.62). It is possible to observe that the male gender, at first, presents higher prevalence of caries when compared to female participants. In spite of that, by observing the 95%CI, it is possible to notice overlapping intervals. This indicates the absence of statistically significant differences between genders. It is worth to mention that the DMFT Index, according to the age of 12 years old, which is considered to be the international comparability pattern, presented average of 2.73.

The categorization of the DMFT Index in two groups, one of those who do not have caries (DMFT = 0) and another one for those with caries (DMFT ≥ 1), enabled to observe that 26.61% of indigenous peoples aged from 10 to 14 years old were caries free.

By analyzing the DMFT Index according to its components, there was an average of 22.25 healthy teeth, 1.72 decayed teeth, 0.03 filled/decayed teeth, 0.43 filled teeth and 0.21 missed teeth.

Table 2 presents the results of the Poisson univariate and multiple regression models. Among the variables in the univariate analysis, the ones that remained in the final model of the multiple analysis were: mean of inhabitants per household in the villages, number of inhabitants, per capita income, age, sex, ability to read and write, not sleeping due to oral problems, satisfaction as to teeth/mouth, dentist appointments, toothache and need for dental treatment.

Table 1. Descriptive statistics of the DMFT Index according to sex and age. Pernambuco, 2010.

Variable	n (%)	Mean	SD	Median	IQI	95%CI
Sex						
Male	121 (51.93)	2.64	2.88	2.00	3.00	2.12 – 3.16
Female	112 (48.07)	2.11	2.28	2.00	3.00	1.68 – 2.53
Age (years)						
10	48 (20.60)	1.69	1.81	1.00	3.00	1.16 – 2.21
11	53 (22.75)	1.68	2.00	1.00	3.00	1.13 – 2.23
12	44 (18.88)	2.73	3.42	2.00	2.75	1.69 – 3.77
13	43 (18.45)	2.81	2.43	2.00	3.00	2.07 – 3.56
14	45 (19.35)	3.20	2.97	2.00	4.50	2.31 – 4.09
Total	233 (100.0)	2.38	2.62	2.00	4.00	2.04 – 2.72

SD: standard deviation; IQI: interquartile interval; 95%CI: 95% confidence interval

In the multiple analysis, the variables: higher average of inhabitants per household in the villages (Block 1), more inhabitants per household (Block 2), older age, male gender, not being able to read and write (Block 3) and very dissatisfied/dissatisfied with teeth/mouth (Block 4) were negatively associated with the absence of caries. While the variables higher per capita income (Block 2), not sleeping due to oral problems (Block 4), have never been to the dentist (Block 5), absence of pain and not needing dental care (Block 6) presented a positive association with the absence of caries.

DISCUSSION

Considering that the health/disease determinants are distributed in organization systems, from cellular to social ones[24], the availability of data aggregated in different levels was used to conduct a multilevel analysis, which would be able to improve the understanding of the oral health/disease process. This possibility ensured the simultaneous approach of contextual and individuals factors in the analysis. The adopted hierarchical model considered aspects from the contextual level as being mediators to the whole network of individual determination.

By supporting a counter-hegemonic proposal, which is traditional in health studies that aim at measuring disease, the outcome of this study is the absence of caries among indigenous people aged from 10 to 14 years old, that is, a health condition. The change in paradigm may not affect the epistemological reference of the study, once the absence of caries is a complementary measurement of its presence, thus inverting the comparison referential.

Table 2. Prevalence ratio of the absence of caries among Xukurus from Ororubá aged from 10 to 14 years old, according to estimates of the Poisson univariate and multiple regression model. Pernambuco, 2010.

	Univariate analysis				Multiple analysis			
	RC	PR	95%CI	p-value	RC	PR	95%CI	p-value
Contextual level variables - Block 1								
Mean of inhabitants per household in the village	-0.310	0.733	0.483 – 0.984	0.0153	-0.310	0.733	0.483 – 0.984	0.0153
Contextual level variables - Block 2*								
Inhabitants	-0.049	0.952	0.938 – 0.966	< 0.0001	-0.031	0.969	0.940 – 0.999	0.0374
Material of the household floor								
Ceramic	–	1.000	–	–	–	–	–	–
Cement	-0.099	0.906	0.620 – 1.192	0.4981	–	–	–	–
earth	-0.668	0.513	0.134 – 0.891	0.0005	–	–	–	–
Per capita income								
Until the median (≤ R$80.13)	–	1.000	–	–	–	1.000	–	–
Above the median (> R$80.13)	0.248	1.281	1.113 – 1.450	0.0039	0.190	1.209	1.035 – 1.384	0.0317
Individual level variables - Block 3†								
Age	-0.180	0.835	0.759 – 0.912	0.0334	-0.165	0.848	0.742 – 0.954	0.0021
Sex								
Female	–	1.000	–	–	–	1.000	–	–
Male	-0.537	0.584	0.181 – 0.988	0.0090	-0.445	0.641	0.241 – 1.041	0.0293
Can read and write								
Yes	–	1.000	–	–	–	1.000	–	–
No	-0.452	0.636	0.237 – 1.036	0.0270	-0.307	0.736	0.536 – 0.936	0.0025
Individual level variables - Block 4‡								
Teeth hurt while brushing								
Yes	–	1.000	–	–	–	–	–	–
No	0.551	1.735	1.572 – 1.898	< 0.0001	–	–	–	–
Trouble sleeping								
Yes	–	1.000	–	–	–	1.000	–	–
No	1.099	3.001	2.870 – 3.132	0.0000	0.293	1.340	1.068 – 1.613	0.0352

Table 2. Continuation.

	Univariate analysis				Multiple analysis			
	RC	PR	95%CI	p-value	RC	PR	95%CI	p-value
Satisfaction as to teeth/mouth								
Very satisfied/ satisfied	–	1.000	–	–	–	1.000	–	–
Indifferent	-0.389	0.678	-0.696 – 2.052	0.5795	-0.371	0.690	-0.284 – 1.664	0.4551
Very dissatisfied/ dissatisfied	-0.863	0.422	0.228 – 0.616	< 0.0001	-0.601	0.548	0.358 – 0.738	< 0.0001
Individual level variables - Block 5§								
Attending the dentist								
Has been to the dentist	–	1.000	–	–	–	1.000	–	–
Has never been to the dentist	0.335	1.398	0.957 – 1.839	0.1364	0.342	1.408	1.073 – 1.743	0.0456
Reason for last appointment								
Has never been to the dentist	-0.118	0.889	0.062 – 1.716	0.7800	–	–	–	–
Check-up	–	1.000	–	–	–	–	–	–
Pain	-0.486	0.615	-0.461 – 1.691	0.3762	–	–	–	–
Exodontics	-0.416	0.660	0.491 – 0.828	0.0115	–	–	–	–
Treatment	-0.595	0.552	-0.530 – 1.633	0.2811	–	–	–	–
Individual level variables - Block 6||								
Toothache								
Yes	–	1.000	–	–	–	1.000	–	–
No	1.288	3.626	3.134 – 4.117	0.0029	1.257	3.515	3.127 – 3.903	< 0.0001
Need for dental treatment								
Yes	–	1.000	–	–	–	1.000	–	–
No	0.529	1.697	1.380 – 2.015	0.0011	0.428	1.534	1.274 – 1.795	0.0013

RC: regression coefficient; PR: prevalence ratio; 95%CI: 95% confidence interval; PR*: prevalence ratio adjusted for the variables in blocks 1 and 2; PR†: prevalence ratio adjusted for the variables in blocks 1, 2 and 3; PR‡: prevalence ratio adjusted for the variables in blocks 1, 2, 3 and 4; PR§: prevalence ratio adjusted for the variables in blocks 1, 2, 3, 4, and 5; PR|| prevalence ratio adjusted for the variables in blocks 1, 2, 3, 4, 5, and 6.

To validate the method applied in oral examinations, the type of agreement was classified from Kappa coefficient values. The interexaminer and intra-examiner coefficient values ranged from 0.81 – 0.99, thus obtaining great agreement[25].

By the presented results, it is interesting to point out to similarities and differences in comparison with findings in literature. The SBBasil 2010 report is an important source for comparison because its data collection was carried out in 2010, by the same method. The SBBrasil 2010 revealed that, at the age of 12, 43.5% of the adolescents were caries free[5].

Guimarães[26] and Sampaio et al.[27] published studies about the oral health or indigenous peoples in the Northeast of Brazil. Guimarães[26] analyzed a data base from the ethnicity Fulni-ô, in Pernambuco. The data were made available by the National Health Foundation (FUNASA), which, in 1998, conducted oral examinations in 638 indigenous people from this ethnicity. Among the 34 12 year-old indigenous people, 29% were caries free. Sampaio et al.[27] conducted oral examinations in 1,461 Potiguara Indians, from Paraíba, distributed in different age groups. Among the 159 12 year-old individuals, 16.98% presented DMFT equals zero.

These comparisons reveal that, among the mentioned indigenous peoples, the Fulni-ô had higher percentage of caries free individuals at the age of 12. However, the percentage of caries free teeth of non-indigenous people presented by SBBrasil 2010 is much higher, which configures the inequality between both populations.

As to analytic statistics, the negative association between the absence of caries and older age was an expected result. The older the age, the longer the time of exposure to the risk of caries, which promotes increasing prevalence of the disease.

The association between sex and oral health was studied by Davoglio et al.[28], who investigated 1,170 students aged between 12 and 18 years old, in the municipal public network of Gravataí, Rio Grande do Sul. The authors observed an association between the frequency of tooth brushing and sex. Girls brushed their teeth ≥ 3 times/day, and this frequency 18% higher than that found for boys.

The observation of differences related to the adoption of health habits and behaviors between sexes has identified that women adopt more positive behaviors in relation to health than men. The biggest concern of the female gender with physical appearance is reflected on oral health habits and behaviors[29].

Factors related to the social roles of the gender with work can also explain the negative association between the male sex and the absence of caries observed among Xukuru adolescents. Boys usually support their families in agriculture and husbandry activities, while girls perform manual crafts, like handicrafts and renaissance lace. The performance of manual works in the household makes it easier to adopt oral hygiene habits.

The analysis of socioeconomic status through the variable per capita income showed a positive association between higher income and the absence of caries. Similarly to this result, Freire et al.[30], based on primary data from SBBrasil 2010, verified the association between the prevalence and severity of caries among 12 year-old Brazilian children and individual and contextual factors. Among the findings in that study, they identified a negative association between the prevalence of caries and socioeconomic status, assessed by family income.

Moreira and Nico[31] also observed the association of socioeconomic contextual factors with the absence of caries. Through a multilevel analysis, the authors investigated 12 year-old Brazilian students in 1986, 1996 and 2003. They observed an association between the increasing life expectancy at birth and the percentage of individuals in houses with three rooms or more, with the absence of caries, both in 1986 and in 2003.

The influence of socioeconomic factors on the access to housing, clothing, food and services turn them into important predictors of inequality concerning the distribution of dental caries among Brazilian students[32].

This study also verified the existence of a positive association between the absence of caries and the fact of never having gone to the dentist. The analysis of access to dental services is very complex. If, on the one hand, the lack of access is determinant for tooth loss, on the other, dental assistance that is organized based on the curative biomedical model is also seen as mutilating[33,34]. The result can demonstrate the understanding among adolescents that a good oral health condition is associated with the absence of pain and suffering, so the search for dental services is not necessary with the absence of these characteristics.

Concerning the DMFT Index, the profile analyzed by this study emphasizes the 2.38 mean, classified as low caries condition according to the parameters adopted by WHO[35]. However, it is essential to analyze the components of the index. The Xukuru people presented a 1.72 mean for the decayed component, while SBBrasil 2010 verified, in the 12-year old population of Recife, an average of 0.76 decayed teeth[5]. The existence of more than twice as many decayed teeth per indigenous person is a probable reflex of the difficulties to access health services.

With regard to life/health conditions of the Xukuru from Ororubá living in the indigenous territory, the supply of fluoridated water is not a reality yet. Besides, it is worth to mention that nowadays no cities in the state of Pernambuco provide fluoridated water to the population[36]. On the contrary, fluoridated dentifrices, as well as tooth brushes, are inserted in daily hygiene habits of the Xukuru people. Sometimes, they are distributed by the three Oral Health Teams, who go through the eight Health Units and schools from the indigenous territory. Sometimes they are purchased by the Xukurus themselves. So, when they need to buy it for themselves, indigenous people with higher income can access oral hygiene elements more easily.

Besides, the diet of the Xukuru population includes a combination of cultivated and industrialized foods, which is an influence of the proximity of the indigenous territory and the urban zone of the city of Pesqueira.

A negative aspect of the study can be related to the dependent variable DMFT Index. The fact of establishing a cutoff point so that the variable can be used in a binary form makes so that the category with index different from zero equals those with one decayed tooth and those with high DMFT Index. Therefore, even if in practice the individual has only one decayed tooth is very close to the absence of caries, with categorization this proximity is lost.

It is important to mention that since this is a cross-sectional study, the used hierarchical model does not allow making causal inferences; we can only demonstrate associations between the different levels of explanatory variables and the outcome "absence of caries".

CONCLUSION

It was observed that the absence of caries is associated with contextual and individual aspects of the indigenous people Xukuru, from Ororubá, in the age group from 10 to 14 years old.

The association of oral health to collective and individual aspects placed in several levels of the organization enables to understand the connection of oral health and the other fields in the governmental agenda. In this complex and trans-sectorial context, social, economic and political measures addressed to facing social exclusion must walk side by side with oral health promotion.

ACKNOWLEDGEMENTS

REFERENCES

1. Organização Mundial de Saúde (OMS). Levantamentos básicos em saúde bucal. 4 ed. São Paulo: Livraria Santos Editora; 1999.

2. Marthaler TM. Changes in Dental Caries 1953-2003. Caries Res 2004; 38(3): 173-81.

3. World Health Organization (WHO). The World Oral Health Report 2003. Continuous improvement of oral health in the 21st century—the approach of the WHO Global Oral Health Programme. Geneva: WHO; 2003.

4. Narvai PC, Frazão P, Roncalli AG, Antunes JLF. Cárie dentária no Brasil: declínio, iniqüidade e exclusão social. Rev Panam Salud Pública 2006; 19(6): 385-93.

5. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Secretaria de Assistência à Saúde. Departamento de Atenção Básica. Coordenação Nacional de Saúde Bucal. SB Brasil 2010 - Pesquisa Nacional de Saúde Bucal: resultados principais. Brasília: Ministério da Saúde; 2012.

6. Narvai PC, Frazão P, Castellanos RA. Declínio na experiência de cárie em dentes permanentes de escolares brasileiros no final do século XX. Odontol Sociedade 1999; 1(1/2): 25-9.

7. Brasil. Ministério da Saúde. Divisão Nacional de Saúde Bucal. Levantamento epidemiológico em saúde bucal: Brasil, zona urbana, 1986. Brasília: Ministério da Saúde; 1988. 137 p.

8. Brasil. Ministério da Saúde. Secretaria de Assistência à Saúde. Departamento de Assistência e Promoção à Saúde. Coordenação de Saúde Bucal. Levantamento epidemiológico em saúde bucal: 1ª etapa: cárie dental: projeto. Brasília: Ministério da Saúde; 1996.

9. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Secretaria de Assistência à Saúde. Departamento de Atenção Básica. Coordenação Nacional de Saúde Bucal. Condições de Saúde Bucal da População Brasileira 2002-2003: Resultados Principais. Brasília: Ministério da Saúde; 2004.

10. Rigonatto DDL, Antunes JLF, Frazão P. Dental caries experience in indians of the upper Xingu, Brazil. Rev Inst Med Trop S Paulo 2001; 43(2): 93-8.

11. Niswander JD. Further studies on the Xavante indians. VII. The oral status of the Xavantes of Simões Lopes. Am J Hum Genet 1967; 19(4): 543-53.

12. Arantes R. Saúde bucal dos povos indígenas no Brasil: panorama atual e perspectivas. In: Coimbra Jr CEA, Santos RV, Escobar AL. (Org.) Epidemiologia e

saúde dos povos indígenas no Brasil. Rio de Janeiro: FIOCRUZ/ABRASCO; 2003. p. 49-72.

13. Detogni AM. Práticas e perfil em saúde bucal: o caso Enawene-Nawe, MT, no período 1995-2005 [dissertação de mestrado]. Cuiabá: Universidade Federal de Mato Grosso; 2007.

14. Leite MS. Transformação e persistência: antropologia da alimentação e nutrição em uma sociedade indígena amazônica. Rio de Janeiro: Editora FIOCRUZ; 2007.

15. Arantes R, Santos RV, Frazão P. Oral health in transition: the case of Indigenous peoples from Brazil. Int Dent J 2010; 60(3 Suppl 2): 235-40.

16. Instituto Brasileiro de Geografia e Estatística (IBGE). Censo Demográfico 2010: Características Gerais dos Indígenas - Resultados do Universo. Rio de Janeiro: IBGE; 2012. Disponível em: http://biblioteca.ibge.gov.br/visualizacao/periodicos/95/cd_2010_indigenas_universo.pdf. (Acessado em: 17 de abril de 2014).

17. Gonçalves GMS, Gurgel IGD, Costa AM, Almeida LR, Lima TFP, Silva E. Uso de agrotóxicos e a relação com a saúde na etnia Xukuru do Ororubá, Pernambuco, Brasil. Saúde Soc 2012; 21(4): 1001-12.

18. Neves RCM. Dramas e Performances: o processo de reelaboração étnica Xukuru nos rituais, festas e conflitos. [tese de doutorado]. Florianópolis: Universidade Federal de Santa Catarina; 2005.

19. Peres MA, Traebert J, Marcenes W. Calibração de examinadores para estudos epidemiológicos de cárie dentária. Cad Saúde Pública 2001; 17(1): 153-9.

20. Brasil. Ministério da Saúde. Secretaria de Vigilância à Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Coordenação Nacional de Saúde Bucal. Manual de Calibração de Examinadores. Projeto SBBrasil 2010. Brasília: Ministério da Saúde; 2009.

21. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Secretaria de Vigilância em Saúde. Departamento de Atenção Básica. Coordenação Nacional de Saúde Bucal. SB Brasil 2010 Pesquisa Nacional de Saúde Bucal: Projeto Técnico. Brasília: Ministério da Saúde; 2009.

22. Goldstein H. Multilevel statistical models. 3 ed. London: Edward Arnold; 2003.

23. Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. BMC Med Res Methodol 2003; 3: 21.

24. Nadanovsky P, Luiz RR, Costa AJL. Causalidade em saúde bucal. In: Luiz RR, Costa AJL, Nadanovsky P. Epidemiologia e bioestatística em Odontologia. São Paulo: Atheneu; 2008.

25. Pereira MG. Epidemiologia. Teoria e Prática. Rio de Janeiro: Guanabara Koogan; 1995.

26. Guimarães CD. Prevalência de cárie dentária e fatores de risco na comunidade indígena Fulni-ô – Pernambuco. [dissertação de mestrado]. Camaragibe: Universidade de Pernambuco, Camaragibe; 2000.

27. Sampaio FC, Freitas CH, Cabral MB, Machado AT. Dental caries and treatment needs among indigenous people of the Potiguara Indian reservation in Brazil. Rev Panam Salud Pública 2010; 27(4): 246-51.

28. Davoglio RS, Aerts DRGC, Abegg C, Freddo SL, Monteiro L. Fatores associados a hábitos de saúde bucal e utilização de serviços odontológicos entre adolescentes. Cad Saúde Pública 2009; 25(3): 655-67.

29. Abegg C. Desenvolvimento de comportamentos e hábitos condutores à saúde bucal. In: Bönecker M, Sheiham A (Orgs.). Promovendo a saúde bucal na infância e adolescência: conhecimentos e práticas. Porto Alegre: Editora Santos; 2004.

30. Freire MCM, Reis SCGB, Figueiredo N, Peres KG, Moreira RS, Antunes JLF. Determinantes individuais e contextuais da cárie em crianças brasileiras de 12 anos em 2010. Rev Saúde Pública 2013; 47(Suppl 3): 40-9.

31. Moreira RS, Nico LS. Aspectos contextuais de ausência de cárie em escolares de 12 anos no Brasil, em três períodos históricos. Rev Odontol UNESP 2010; 39(5): 263-70.

32. Piovesan C, Mendes FM, Antunes JL, Ardenghi TM. Inequalities in the distribution of dental caries among 12-year-old Brazilian schoolchildren. Braz Oral Res 2011; 25(1): 69-75.

33. Sheiham A. Assessment of the role of western dentistry: the limits to conventional dentistry. In: Mautsch W, Sheiham A. Promoting oral health in deprived communities. Berlin: The Oral Health Alliance; 1995.

34. Sheiham A. Strategies for promoting oral health care. Rev Bras Odontol Saúde Coletiva 2001; 21(1): 7-24.

35. World Health organization (WHO). Oral health surveys: basic methods. 3 ed. Geneva: WHO; 1977.

36. Martelli P. Pernambuco: Estado desenvolvido é Estado que trata e fluoreta suas águas de beber. Blog de Jamildo. Publicado em 12 de maio de 2011. Disponível em: http://jc3.uol.com.br/blogs/blogjamildo/canais/noticias/2011/05/12/em_artigo_professor_denuncia_que_compesa_falha_na_fluoretacao_da_agua_que_o_pernambucano_bebe_100571.php. (Acessado em 06 de fevereiro de 2012).