Evaluation of the periodontal status in an Afro-Uruguayan population living in Montevideo: a cross-sectional study

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Abstract

The diversity approach in health focuses on recognizing and paying special attention to the different interests, demands, needs and health-disease processes specific to certain people. Ethnic-racial considerations in these cases become fundamental.

In Uruguay, census data show that 8.1% of the population (approximately 255,000 people) consider themselves Afrodescendants, which makes them the main ethnic-racial minority of the country.

To date, there are no surveys on the periodontal condition of Afrodescendant population in our country.

Objective: to evaluate the oral and periodontal status of patients through health-disease process indicators.

Materials and methods: descriptive, cross-sectional study of the Afro-Uruguayan population. Inclusion criteria: age range from 15 to 35, living in Montevideo. Exclusion criteria: pregnancy, having received periodontal treatment or treatment with antibiotics in the last 6 months. The size of each population sample with or without African origin was of 40 individuals each, half men, half women. The Rediente Clinical History was used, the periodontal parameters were recorded using a periodontal probe calibrated by millimeter, and six sites per tooth were examined in a full mouth.

Results: the group of Afrodescendants have one less tooth, on average, than non-Afrodescendants, especially the first mandibular molars. They also show higher prevalence, depth and severity of attachment loss compared to the control group. No statistically significant differences were found in probing depth between the two groups.

Conclusions: Afrodescendants became part of the popular sectors of society, which makes them more vulnerable. In the age range considered (15-35), Afrodescendants have higher prevalence, extension and severity of clinical attachment loss than non-Afrodescendants. No statistically significant differences were found in the considered age range regarding probing depth in the populations examined.

Key words: Afrodescendants, adolescents and young adults, periodontal disease.

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Background and justification

The diversity approach in health focuses on recognizing and paying special attention to the different interests, demands, needs and health-disease processes specific to certain people. Ethnic-racial considerations in these cases become fundamental[(1)]. This work arose from questions posed by the promoters of the Afro-Uruguayan group about the oral health of its members in the country.

Ethnic-racial ancestry is determined by the self-identification of people with one of the following options. Afrodescendants are those who state to have: a) exclusive African ancestry; b) more than one ancestry indicating African as the main one; c) more than one ancestry, including African, although this is not considered the main one. Non-Afrodescendants are the ones whose ancestry or ancestries do not include African[(2).] Race (an obsolete concept) is the result of external social ascription, while ethnicity responds to an internal definition that refers to the feeling of belonging to a community[(3).]

The Afrodescendant population of the Americas is concentrated in the poorest residential areas, with the largest housing deficit, poor access, inadequate means of transportation and greater exposure to crime and violence. This reality could influence this group regarding its access to low quality health care added to the lack of intercultural approach to medical treatment, of policies that specifically address the diseases that most affect Afrodescendants and of provision of specific medication[(4).]

Poor access to health services would be related to the economic constraints faced by most of the black population (INE, 2008)[(5).] Surveys conducted in Montevideo, the capital, within a pilot study, showed that the percentage of Afro-Uruguayan population that use public and private dental services was 50% and 50%, while in another sample of similar size, social and demographic situation and men-women, but not including Afrodescendants, the ratio was 40% and 60% (Rotemberg et al., 2017)[(6)].

In Uruguay, census data show a strong component of Caucasian origin of the population. However, 255,000 Afrodescendants (about 8.1% of the total population) are recognized as the

“main ethnic-racial minority of the country”. They are located mainly in the dry border with Brazil and in the suburbs of the Department of Montevideo[2].

Afrodescendants show lower levels of education than the rest of the population, despite improvements in education coverage. In people over 12 years of age, the gap in formal education attendance is noticeable, and accentuates as age increases, especially in the 18-24 age range. Post-secondary education of Afrodescendants is significantly lower. Young Afrodescendants enter the labor market at an early age and leave it late compared to the rest of the population[7].

The census conducted in Uruguay in 2012 showed that the Afrodescendant group has a higher number of unsatisfied basic needs compared to non-Afrodescendants, and that their poverty rate is more than double: 27.2% for Afrodescendants while 12.4% for non-Afrodescendants[8].

Regarding tobacco consumption and sex, men show a higher percentage of daily tobacco smoking (22.3%), 7.6% being the gap with women. As for ethnicity, Afrodescendants also present a higher percentage of daily tobacco users (24.6%), and the difference with non-Afrodescendants is 6.7%. Additionally, tobacco consumption according to the poverty line shows that 25.3% of people living in poverty are daily tobacco users, while for people above the poverty line, the value is 17.6%[9].

Afrodescendants also have a greater risk of developing certain pathologies, which can potentially affect their descendants. Thus they are more prone to develop glaucoma[10,11], hemoglobinopathies[12–14], hypertension[14,15] and diabetes[15,16].

Research conducted on African-Americans living in the United States of America (USA) found a higher prevalence of periodontal disease in this population (7.5%), followed by Hispanic (4.4%) and white (1.2%) populations[17].

Periodontal diseases are a group of pathologies of multifactorial origin, initiated by a specific biofilm, where the patient's response is modulated by various factors such as smoking, diabetes, obesity and socioeconomic status[18].

Epidemiological surveys conducted in the USA have shown that African-American adolescents are 5 to 15 times more likely to develop periodontitis compared to Caucasian adolescents. The percentage rises as age increases[19,20]. In addition, the race-gender interaction shows that men are nearly three times more likely to have periodontitis than women with darker skin[17].

A population-based study in Brazil, where more than 11,000 people aged 35-44 were evaluated, showed that Afrodescendants were 1.6 times more likely to develop periodontitis compared to non-Afrodescendants[21]. A systematic review of papers published between 1999 and 2008 in Brazil analyzed periodontal variables in relation to social inequalities (including race), showing a significant association between race and periodontal disease[22].

In 2010-2011, the School of Dentistry of Universidad de la República (UdelaR) conducted the First National Survey of Oral Health among Uruguayan young people and adults. In the 15-24 age range the percentage of individuals without gingivitis signs, calculus and periodontal pockets >4 mm was close to 30%, almost twice the number found in the Uruguayan population[23].

Morales et al. (2015) analyzed adolescents between 15 and 19 years of age in Latin America (including Uruguay). Of these, 28.6% showed >25% of sites with bleeding on probing while about 60% reported a probing depth >4 mm[24]. However, none of the studies mentioned above reported data on ethnic and racial origin of adolescents or young adults and their association with periodontal disease.

The impact of the social determinants suffered by the Afrodescendant population and its links with periodontal disease lies in the greater number of stressful situations (as a consequence of labor and educational inequalities, among other reasons), whose direct result is a deterioration of the defensive function against bacterial colonization and an increased synthesis of proinflammatory cytokines[21].

The JP2 genotype of *Aggregatibacter actinomycetemcomitans* is present in endemic form in populations of African origin. Studies have shown that the high leukotoxicity of the JP2 genotype of *Aggregatibacter actinomycetemcomitans* has been associated with periodontal attachment loss in Afrodescendants[25–27].

The genetic polymorphism of IL-1 plays a key role in periodontal disease. The 2/2 genotype of the *IL-1* receptor antagonist (*IL-1ra*) and the allele T of *IL-1beta* in the sample of African-Americans and mulattos of a Brazilian population is associated with chronic periodontitis, suggesting a genetic susceptibility to the disease[28].

In Uruguay there is no history of studies focusing on the periodontal condition of the Afrodescendant population.

General objective: To evaluate the oral health of Afrodescendants compared to a sample of non-Afrodescendants with similar social and demographic conditions, and age range.

Specific objective: To estimate the periodontal status of a sample of Afro-Uruguayan adolescents and young adult population using health-disease process indicators.

Materials and methods: Cross-sectional study conducted in populations of both sexes aged between 15 and 35, living in different municipalities of Montevideo, considering as a reference the Apex-Cerro Program of Universidad de la República, the Naval Area of Cerro and the House of Afro-Uruguayan Culture. The sample included 40 Afrodescendants and 40 non-Afrodescendants with similar socio-demographic characteristics and gender ratio. The type of quota sampling (the same number of participants per group) of some geographic regions of the capital did not intend to be representative of the Afro-Uruguayan population.

The socio-demographic information, the systemic diseases self-report and the oral hygiene habits data were collected in the REDIENTE clinical history approved by the Board of the School of Dentistry (UdelaR)[29].

The clinical examination was done in a dental office. The oral examination to discard soft tissue lesions was followed by recording the number of lost teeth. All the completely erupted teeth (except third molars) were examined in six sites: mesio-vestibular, vestibular, disto-vestibular, mesio-lingual or mesio-palatal, lingual or palatal and disto-lingual or disto-palatal. This was done using the Hu Friedy periodontometer, North Carolina model (UNC PCP 15), calibrated by millimeter. Probing depth and gingival recession were considered as variables. Probing depth was defined as the distance from the gingival margin to the bottom of the gingival sulcus or periodontal pocket[30]. Gingival recession was defined as from the cementoenamel junction to the gingival margin[31].

Ethical considerations: The project "Evaluación del estado de salud buco-dental y periodontal en la población afrouruguaya" was approved by the Research Ethics Committee of the School of Dentistry in Montevideo, dated August 6, 2013, File No. 091900-000135-13.

Reproducibility of the examiners: In order to control errors or biases, examiners (ER, AB, CC and FA) were subjected to a process of training and calibration on periodontal variables (probing depth and gingival recession) with teachers from the Periodontal Department (UdelaR). First, theoretical aspects of each indicator were defined and agreed among all the members of the examination team, followed by a clinical training stage. Finally, eight patients with varying degrees of periodontal disease were selected to quantify the reproducibility of measurements[32]. Both for probing depth and for gingival recession, the Intraclass Correlation Index was 0.7, which was considered successful[33].

Statistical analysis: For statistical calculations, researchers followed the guidelines of Holtfreter et al. 2015[34]. Clinical Attachment Loss (CAL) was considered as the primary variable from the calculation of Probing Depth and Gingival Recession. Probing Depth was defined as a secondary variable. First, univariate analyses were conducted to compare in the study populations: age, tobacco smoking, self-report of systemic diseases, need for prosthesis, municipality where they reside and number of erupted teeth.

The exposure to tobacco, the self-reporting of systemic diseases and the need for prostheses were classified as dichotomous variables (0–absence/1–presence). On the other hand, lost teeth were considered quantitatively. The mean per group was calculated and there was also a subdivision into age groups: 15-24 and 25-35. The municipality of residence was divided into two categories: 0 –Low socioeconomic status (Municipalities A, D, F and G) and 1– High socioeconomic status (Municipalities B, C, Ch and E). (Figure 1 - Map of Municipalities of Montevideo)[35].

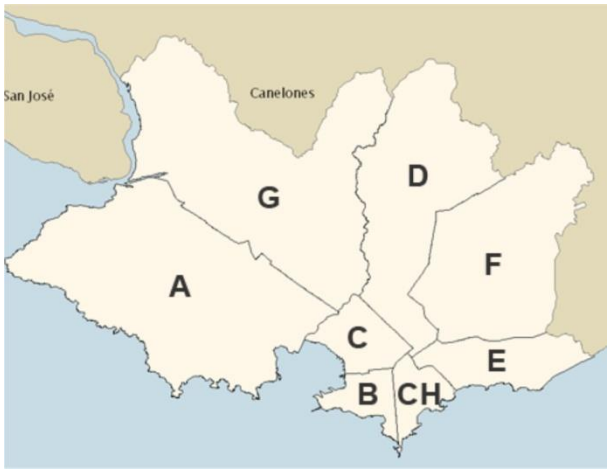

Figure 1 - Map of Municipalities of Montevideo

To detect differences between the groups, the Wilcoxon test was conducted in the cases of attachment loss and probing depth, while the chi-square test was used for the dichotomous indicators.

The prevalence of attachment loss (CAL) was categorized into >3 mm and >5 mm, while probing depth (PD) was divided into >4 mm and >6 mm. Severity was obtained from comparing the means and the extension by the number of sites/mouth of CAL>3 mm and >5 mm and PD> 4 mm and >6 mm[34].

A statistical significance of 95% was considered (p <0.05%) in all cases. LibreOffice 5.1\Calc®, EPIDAT 4.2 and R Studio 1.0.44 were the statistical software solutions used.

Results

A total of 80 people were surveyed: 40 Afrodescendants and 40 non-Afrodescendants, with the same ratio of men and women in each group (Table 1).

It was a young population with an average age of 26.6+6.4 years. However, Afrodescendants as a whole were older than non-Afrodescendants, 28.9+6.1 vs. 24.2+6, and in turn, a higher proportion belonged to the second age group (25-35): 29 (36.2%) vs. 16 (20%), showing a statistically significant difference (p=0.006).

Regarding smoking, 16 individuals (20% of the total population) from the Afrodescendants group smoked, while there were only 5 smokers in the control group (6.2%) (p=0.01).

There were few people that reported having general diseases (12.5% of the total), while 17.5% reported the need for prosthesis, which showed no significant differences between the study groups (p=0.73 and p=0. 76).

For the most part, the studied population lived in municipality A (73%). The others resided in municipalities B (8.7%), G (6.2%), CH (5%), D (2.5%), F (2.5%), E (1.2%). In turn, 31 Afrodescendants resided in the municipalities considered of low socioeconomic status, while 37 non-Afrodescendants also belonged to this stratum (p=0.11).

Within the oral hygiene habits surveyed, approximately 90% of the participants reported brushing their teeth at least twice a day, while 85% claimed to use medium or hard toothbrushes. There were no significant differences between the groups.

Furthermore, more than half the people (55%) reported having seen the dentist in the last 12 months. In this case, there were no significant differences between the study populations. As for medical attention, 83% of Afrodescendants aged 18 and over reported having seen a doctor in a study conducted in municipality B, showing a gender gap in favor of women[14].

In this work, the systemic diseases recorded in the Afrodescendant population were: hepatitis B, hyperthyroidism and epilepsy. Each pathology was found in a different individual, and arterial hypertension was found in three participants. In the non-Afrodescendant population, the systemic diseases were: asthma, meningitis (each pathology in a different individual) and arterial hypertension was found in two cases.

The Afrodescendant group has an average of one less tooth (23.6 + 4.1 vs. 25.2 + 2.9, p=0.001). Molars were the most lost (specifically the first lower molars).

Afrodescendants exhibited a higher prevalence of CAL>3 mm (7.4% versus 1.8%) and 5 mm or more (2.1% versus 0.3%, p=0.0000) as well as more sites with CAL>3 mm versus 12.4 + 17.2 versus 3.1+6.1 and >5 mm 3.4+7.1 versus 0.6+1.7, p=0.0000. They also showed higher severity of CAL than non-Afrodescendants: 0.39 mm + 1.2 versus 0.5 + 0.09 mm, p=0.0000.

As for probing depth, there were no statistically significant differences in terms of prevalence, extension or severity between the two populations.

Table 1 - Characteristics of the study populations according to the ethnic-racial group

		Afrodescendants	**Non-Afrodescendants**	**Total**
number of participants		40 (50%)	40 (50%)	80 (100%)

Age (years)*		28.9±6.1	24.2±5.9	26.6±6.4
Age range*	**15 – 24 (years)**	11 (13.7%)	24 (30%)	35 (43.7%)
	25 – 35 (years)	29 (36.2%)	16 (20%)	45 (56.2%)
Male/ Sex		20 (50%)	20 (50%)	40 (50%)
Current smoker*	**Yes**	16 (20%)	5 (6.2%)	21 (26.2%)
	No	24 (30%)	35 (43.7%)	59 (73.7%)
Systemic disease**	**Yes** **No**	6 (7.5%) 34 (42.5%)	4 (5%) 36 (45%)	10 (12.5%) 70 (87.5%)
Need for prosthesis**	**Yes** **No**	8 (10%) 32 (40%)	6 (7.5%) 34 (42.5%)	14 (17.5%) 66 (82.5%)
Frequency of brushing/Day**	**<2/Day**	4 (5%)	4 (5%)	8 (10%)
	≥2/Day	36 (45%)	36 (45%)	72 (90%)

Toothbrush hardness**	**Hard**	13 (16.2%)	6 (7.5%)	19 (23.7%)
	Medium	20 (25%)	29 (36.5%)	49 (61.5%)
	Soft	7 (8.7%)	5 (6.2%)	12 (14.9%)
Most recent dentist appointment**	**Within the last 12 months**	22 (27.5%)	22 (27.5%)	44 (55%)
	More than 12 months before	18 (22.5%)	18 (22.5%)	36 (45%)
Grouped municipalities**	**Low socioeconomic status**	31 (45%)	37 (54%)	68 (85%)
	High socioeconomic status	9 (75%)	3 (25%)	12 (15%)
Remaining teeth+,*		23.6±4.1	25.20±2.9	24.4±3.6

+Excluding third molars, *p=0.01, **Not significant (NS)

Table 2: Periodontal variables in relation to study groups

	Afrodescendants	**Non-Afrodescendants**	**Total**
Attachment loss			
Mean (mm)*	0.39±1.2	0.09±0.5	0.2±0.9
Prevalence of CAL≥3 mm*	7.4%	1.8%	4.6%
Prevalence of CAL≥5 mm*	2.1%	0.3%	1.2%
Sites/mouth ratio of CAL≥3 mm*	12.4±17.2	3.1±6.1	7.8±13.6

Sites/mouth ratio of CAL≥5 mm*	3.4±7.1	0.6±1.7	2.1±5.3
Probing depth			
Mean (mm)**	1.73±0.74	1.69±0.6	1.71±0.7
Prevalence of CAL≥4 mm**	1.4%	0.5%	1%
Prevalence of CAL≥6 mm**	0.01%	0.01%	0.01%
Sites/mouth ratio of CAL>4 mm**	2.3±8.5	1±3.4	1.6±5.3

***p=0.0000 **p=NS**

Discussion

Despite the significant percentage of population of Afro-descendant origin in Uruguay, a country where races, ethnic groups, cultures, religious practices and beliefs are mixed, there are no epidemiological surveys on the general and oral health of the population of African ancestry.

A full-mouth periodontal examination was conducted since it is currently considered the most suitable option for periodontal evaluation[36].

Several studies have evaluated the periodontal condition of Afrodescendants[21,31,37,38].

Afro-Uruguayans exhibited a greater prevalence, extension and severity of loss of attachment when compared to a "white" population with the same socio-economic status and sex. These findings have been detected in several studies[21,37,38]. When we compared our results with other studies, we noticed some difficulties. The Community Periodontal Index (CPI) was the most widely used periodontal index mainly in Latin America, which determines categories and definitions of different periodontal disease applied[21,37-39]. Another problem was that some studies included two study groups, "whites" and "non-whites", the latter including various races (including Afrodescendants and mulattos)[36].

Borrell and Talih (2012) analyzed several individual variables in relation to CAL and PD. As for attachment loss, Afrodescendants showed 0.86 mm + 0.04 versus 0.03+0.76 mm; while probing depth in the Afro-Latin population was 1.18 mm+0.03 versus 0.02 + 0.97 mm for white Hispanics, similar to the results obtained in this survey[40].

Afrodescendants belong to the poorest sectors of society. They showed low income, fewer years of education, difficulties to access health services and worse overall health compared to Caucasian populations. Stressful social inequalities are linked to a state of immunosuppression,

which leads to alterations in the inflammatory mediator levels and in the defense response, thus promoting the development of periodontal disease[21,38].

Regarding the socio-economic factor, the populations of this study resided in similar municipalities, therefore balancing the potential socio-economic differences between them.

Moreover, another explanation for worse periodontal health in Afrodescendants is the high leukotoxicity JP2 genotype of *A. actinomycetemcomitans*, which has been associated with periodontal attachment loss in that population. The JP2 genotype of *A. actinomycetemcomitans* is present in endemic form in populations of African origin[25–27].

Although the evidence available supports the suggestion that Afrodescendants have worse oral health conditions, the mechanism underlying this association is not clear.

The prevalence, extension and severity was evaluated for probing depth. Although Afrodescendants presented worse scores, the difference reached no statistical significance.

This study had several limitations that must be considered. The cross-sectional design does not allow us to make solid inferences about an association between exposure and disease. Additionally, the way the sample was selected (not representative) does not allow us to extrapolate the results to the rest of the target population (external validity). This is why it was not considered appropriate to perform a multivariate regressive analysis to consider age, smoking and ethnicity in relation to loss of attachment.

This study is also key because it is the first one that surveys the periodontal status of the Afrodescendant population in Uruguay, although not using a representative sample.

Conclusions: Afrodescendants became part of the popular sectors of society. They have one less tooth, on average, than non-Afrodescendants. In addition, Afrodescendants have higher prevalence, extension and severity of clinical attachment loss than non-Afrodescendants. No statistically significant differences were found in the considered age range regarding probing depth in the populations examined.

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