

Epidemiological analysis and need for endodontic treatment among the indigenous Sateré-Mawé and Tikuna

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Abstract: The objective of this study was to analyze the epidemiological profile of oral health of Sateré-Mawé indigenous people living in Barreirinha, Amazonas (AM), Brazil, and the Tikuna indigenous people living in the urban area of Manaus (AM), in addition to characterizing the need for endodontic treatment between the two ethnic groups. A total of 138 individuals participated in the study, of whom 98 were Tikuna and 40 were Sateré-Mawé; they were distributed in age groups ranging from seven to 75 years. A very high prevalence of caries was observed in both ethnic groups. For the Sateré-Mawé in the 7-12 age group, the decayed, missing, and filled teeth (DMFT) index presented a mean value of 3.17. Comparing the DMFT index and the need for endodontic treatment in each of the ethnicities, these variables were found to be correlated, because as the DMFT index increases, the chances of needing endodontic treatment increase. The Sateré-Mawé presented a higher prevalence of need for endodontic treatment compared to the Tikuna. The association of comorbidities and the need for endodontic treatment were demonstrated only in the Tikuna, and there was only a correlation of this necessity with the presence of diabetes mellitus (DM) in one case. The need to expand access to oral health in these communities is emphasized, taking into account geographical access and technological, environmental, linguistic, and cultural barriers.

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Introduction

In recent years, there has been a growing number of studies on the oral health conditions of indigenous peoples in Brazil. However, in addition to being scarce, these studies have a diversity that ranges from the methodology used and the age groups examined to the model of dental care presented in each study. These factors have led to difficulties in comparing the results. However, among the studies presented in the literature,^{1,2} the authors are unanimous in affirming that the oral health situation in these communities is essentially evaluated only by the epidemiological analysis of dental caries, and they share the notion that there is an association between the increase in the prevalence of caries and the consumption of industrialized foods, particularly sugar, associated with precarious or non-existent dental care in many indigenous communities.

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In the state of Amazonas (AM), in addition to the aggravating factors noted above, several barriers are determinant of dental care. We can highlight distances (geographical access) and technological, environmental, linguistic, and cultural barriers.³

Thus, this study seeks to determine the epidemiological profile of the oral health of indigenous people of the Sateré-Mawé ethnic group living in Barreirinha (AM) and the Tikuna ethnic group living in the urban area of Manaus (AM) in addition to characterizing the need for endodontic treatment between the two ethnicities.

Methodology

Ethical considerations

This study was approved by the ethics committee of the Federal University of Minas Gerais (Universidade Federal de Minas Gerais – UFMG) (CAAE: 65529617.0.0000.5149). Communication with the populations analyzed was performed by translating the reports into the indigenous language whenever necessary.

Patients

The sample consisted of 138 individuals, of whom 98 belonged to the Tikuna ethnic group – living in the Cidade de Deus neighborhood of Manaus – and 40 individuals from the Sateré-Mawé ethnic group – living in Barreirinha, which is in the Middle Andará region of AM. The data collection was performed from April to May 2017.

Variables of interest

The following variables were evaluated through an anamnesis form: comorbidities (systemic arterial hypertension, heart failure, and *diabetes mellitus* (DM), among others); oral health status – decayed, missing, and filled teeth (DMFT) index; gender; and age. The need for endodontic treatment was identified through clinical, radiographic analysis, and the use of pulp sensitivity tests.^{4,5,6}

The study did not include indigenous people who had not resided in their traditional territory for more than a year or those who had lived in the traditional territory of both ethnic groups for less than six months. Patients who had used antibiotics in the previous three months were also not included in the study.

Statistical analysis

The statistical software used was R 3.2.1. The level of significance was 5%. Fisher's exact test and the chi-square test were used when comparing qualitative variables, whereas the t-test and Mann-Whitney test were used when comparing quantitative variables.⁷ The logistic regression model was used to verify the effect of ethnicity, age, and DMFT index on the need for endodontic treatment.⁷

Results

The participants were distributed in the age groups of 7–12 years old, 13–19 years old, 20–29 years old, 30–39 years old, 40–49 years old, and 50 years old or older, according to Figure 1.

Regarding gender, there was a predominance of Sateré-Mawé women, who represented 70% of the population studied; in the Tikuna group, the female gender corresponded to 56% of the sample.

Figure 2 also shows that in both ethnic groups, the age group corresponding to 20–29 years old was the most prevalent.

To evaluate the epidemiological profile of dental caries and the need for endodontic treatment, the DMFT index was used in both ethnic groups, as recommended by the WHO.⁹ Table 1 shows the mean DMFT indices according to ethnicity and age group. It is observed that in all age groups, the DMFT index is higher for the Tikuna compared to the Sateré-Mawé.

Comparing the DMFT index and the need for endodontic treatment in each of the ethnic groups, it was observed that these variables are correlated, because as the DMFT index increases, the need for endodontic treatment increases (Tables 2 and 3).

A significant difference between the age group and the mean DMFT index was observed only in the Tikuna. In the Sateré-Mawé, no significance between the need for endodontic treatment and its correlation with the DMFT index was found (Tables 2 and 3).

Table 4 shows that the Sateré-Mawé presented a higher prevalence of need for endodontic treatment (40%) compared to the Tikuna (29.6%).

Regarding the presence of comorbidities and its relationship with the need for endodontic treatment,

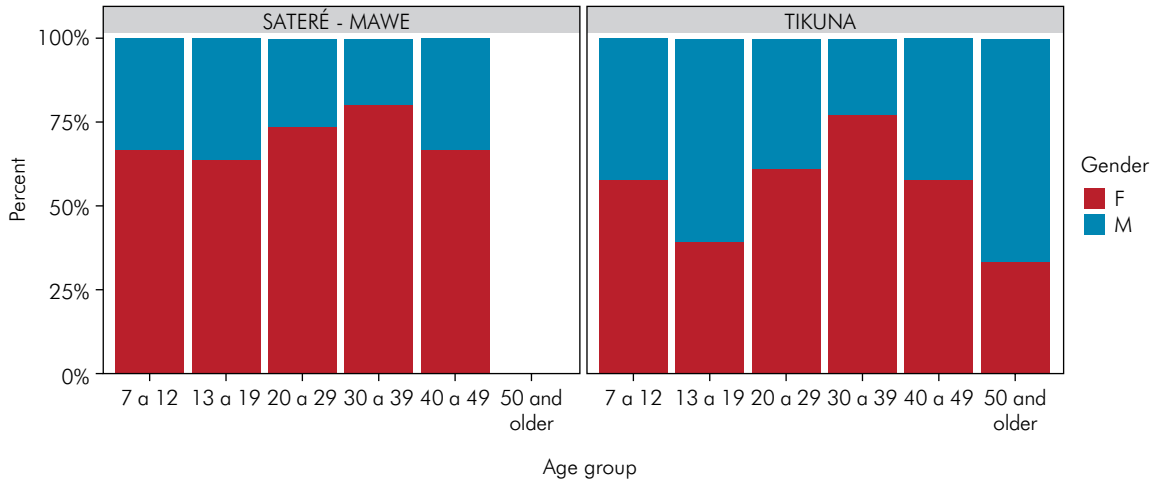


Figure 1. Population of Sateré-Mawé and Tikuna distribution by gender.

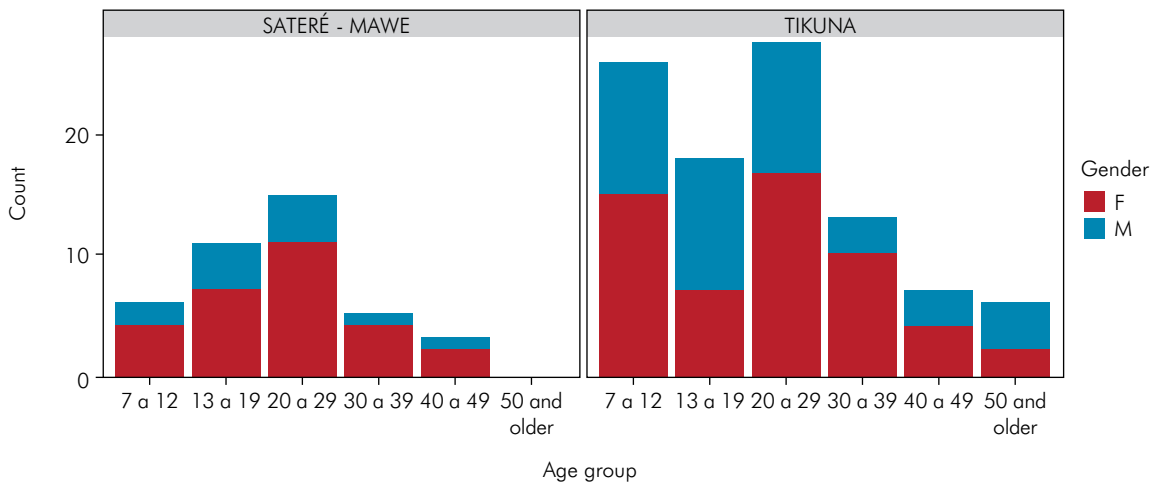


Figure 2. Population of Sateré-Mawé and Tikuna distribution by age.

Table 1. Mean DMFT index: correlation between age group and ethnicity.

| Age group | Ethnicity | | Mean Dmft index |
|--------------|-------------|--------|-----------------|
| | Sateré-Mawé | Tikuna | |
| 7 to 12 | 3.17 | 6.19 | 5.63 |
| 13 to 19 | 6.91 | 7.22 | 7.10 |
| 20 to 29 | 10.27 | 12.00 | 11.40 |
| 30 to 39 | 8.40 | 13.54 | 12.11 |
| 40 to 49 | 12.00 | 14.00 | 13.40 |
| 50 and older | - | 21.83 | 21.83 |
| Total | 8.18 | 10.53 | 9.85 |

it was observed that only 5% of the Sateré-Mawé population and 7% of the Tikuna presented some type of systemic change (Table 5).

Evaluating the relationship of endodontic treatment and the presence of comorbidities, it was observed that in the Sateré-Mawé, only one individual had DM (Table 6).

Among the Tikuna, the incidence of patients with DM and its relationship with the need for endodontic treatment was the same as that found among the Sateré-Mawé, although there were other comorbidities that were not present in that ethnicity, such as asthma, anemia, and systemic arterial hypertension (SAH) (Tables 6 and 7).

Table 2. Descriptive and analytical data of the correlation between the presence of endodontic treatment and socioeconomic variables, DMFT, age, and gender – Tikuna ethnicity.

| Variables | Endodontic treatment | | Total n = 98 (%) | p-value |
|-------------------------------------|----------------------|------------------|---------------------|----------------------|
| | Yes n = 29 (%) | No n = 69 (%) | | |
| Decayed teeth | | | | < 0.001 ^M |
| Median (IQR) | 4 (2.4) | 2 (0.3) | 2 (1.4) | |
| Missing teeth | | | | 0.732 ^M |
| Median (IQR) | 3 (0.6) | 2 (1.6) | 3 (1.6) | |
| Filled teeth | | | | 0.023 ^T |
| Mean (SD) | 4.6 (2.2) | 3.3 (2.5) | 3.7 (2.5) | |
| Dmft index | | | | 0.014 ^M |
| Median (IQR) | 13 (8.15) | 8 (5.15) | 9 (6.15) | |
| Age | | | | 0.591 ^M |
| Median (IQR) | 20 (15.32) | 21 (12.29) | 20.5 (12.30) | |
| Gender | | | | 0.321 ^F |
| F | 19 (65.5) | 36 (52.2) | 55 (56.1) | |
| M | 10 (34.5) | 33 (47.8) | 43 (43.9) | |
| Educational level | | | | 0.466 ^F |
| Incomplete elementary/middle school | 9 (31) | 25 (36.2) | 34 (34.7) | |
| Complete elementary/middle school | 2 (6.9) | 8 (11.6) | 10 (10.2) | |
| Incomplete high school | 7 (24.1) | 10 (14.5) | 17 (17.3) | |
| Complete high school | 9 (31) | 20 (29) | 29 (29.6) | |
| Incomplete higher education | 0 (0) | 3 (4.3) | 3 (3.1) | |
| Complete higher education | 1 (3.4) | 2 (2.9) | 3 (3.1) | |
| Not informed | 1 (3.4) | 1 (1.4) | 2 (2) | |

IQR: Interquartile range; SD: Standard deviation; T: T test; M: Mann-Whitney test; F: Fisher's exact test. Percentage per column; p-value in bold indicates significance.

Table 3. Descriptive and analytical data of the correlation between the presence of endodontic treatment and socioeconomic variables, DMFT index, age, and gender – Sateré-Mawé ethnicity.

| Variables | Endodontic treatment | | Total n = 40 (%) | p-value |
|-------------------------------------|----------------------|------------------|---------------------|--------------------|
| | Yes n = 16 (%) | No n = 24 (%) | | |
| Decayed teeth | | | | 0.484 ^T |
| Mean (SD) | 2.7 (1.6) | 2.3 (1.8) | 2.5 (1.7) | |
| Missing teeth | | | | 0.238 ^T |
| Mean (SD) | 4.2 (2.1) | 3.4 (2.3) | 3.7 (2.3) | |
| Filled teeth | | | | 0.304 ^M |
| Median (IQR) | 2 (2.3) | 1.5 (0.3) | 2 (0.3) | |
| Dmft index | | | | 0.202 ^T |
| Mean (SD) | 9.2 (3.8) | 7.5 (4.5) | 8.2 (4.3) | |
| Age | | | | 0.697 ^T |
| Mean (SD) | 22 (7.8) | 23.4 (12.4) | 22.8 (10.7) | |
| Gender | | | | 0.297 ^F |
| F | 13 (81.2) | 15 (62.5) | 28 (70) | |
| M | 3 (18.8) | 9 (37.5) | 12 (30) | |
| Educational level | | | | - |
| Incomplete elementary/middle school | 5 (31.3) | 4 (16.7) | 9 (22.5) | |
| Complete elementary/middle school | 8 (50.0) | 13 (54.2) | 21 (52.5) | |
| Incomplete high school | 1 (6.3) | 3 (12.5) | 4 (10.0) | |
| Complete high school | 2 (12.2) | 1 (4.2) | 3 (7.5) | |
| Incomplete higher education | - | - | - | |
| Complete higher education | - | - | - | |
| Not informed | - | 3 (12.5) | 3 (7.5) | |

IQR: Interquartile range; SD: Standard deviation; T: T test; M: Mann-Whitney test; F: Fisher's exact test. Percentage per column; p-value in bold indicates significance.

Table 4. Descriptive and analytical data of the correlation between the need for endodontic treatment and ethnicity.

| Ethnicity | Endodontic treatment | |
|-------------|----------------------|------------|
| | Yes - n (%) | No - n (%) |
| Sateré-Mawé | 16 (40) | 24 (60) |
| Tikuna | 29 (29.6) | 69 (70.4) |

p-value of the chi-square test, $p = 0.326$.

Table 5. Descriptive data of the correlation between ethnicity and the presence of comorbidities.

| Ethnicity | Comorbidities | |
|-------------|---------------|------------|
| | Yes - n (%) | No - n (%) |
| Sateré-Mawé | 2 (5%) | 38 (95%) |
| Tikuna | 7 (7%) | 91 (93%) |

Table 6. Descriptive data of the correlation between ethnicity, need for endodontic treatment, and the presence of comorbidities – Sateré-Mawé ethnicity.

| Comorbidities | Need for endodontic treatment | |
|-------------------|-------------------------------|------------|
| | Yes - n (%) | No - n (%) |
| Diabetes mellitus | 1 (3%) | 0 |
| Pregnancy | 1 (3%) | 0 |
| None | 14 (88%) | 24 (100%) |
| Total | 16 (100%) | 24 (100%) |

Table 7. Descriptive data of the correlation between ethnicity, need for endodontic treatment, and the presence of comorbidities – Tikuna ethnicity.

| Comorbidities | Need for endodontic treatment | | |
|--------------------------------|-------------------------------|------------|---------------|
| | Yes - n (%) | No - n (%) | Total - n (%) |
| Diabetes mellitus | 1 (3%) | 1 (1%) | 2 (2%) |
| Pregnancy | 0 (0%) | 2 (3%) | 2 (2%) |
| Anemia | 1 (3%) | 1 (1%) | 2 (2%) |
| Asthma | 2 (7%) | 0 (0%) | 2 (2%) |
| Systemic arterial hypertension | 0 (0%) | 1 (1%) | 1 (1%) |
| None | 25 (86%) | 64 (93%) | 89 (91%) |
| Total | 29 (100%) | 69 (100%) | 98 (100%) |

Discussion

In the literature, scarce studies that address the oral health of indigenous peoples in Brazil have been found. Most of these studies show that the prevalence of dental caries in these communities is above the national average and the goals recommended by the WHO for the year 2000,⁹ particularly in the population

six to 12 years of age.^{1,10,11} However, no study has analyzed the prevalence of need for endodontic treatment in these populations.

The total population of the Sateré-Mawé village is composed of 80 individuals, including children, men, women, and the elderly. A total of 40 individuals from this ethnic group participated in this study. During the execution of the study, both data collection and clinical care were performed during the daytime period. This contributed to the fact that the majority of the volunteers were women, given that during this period, men were absent from the village, hunting and fishing or working on corn crops, the main source of subsistence in the community. In turn, women remain at home taking care of children and performing housework. This finding corroborates a previous study conducted in the Potiguara indigenous community.¹² In addition, the predominance of people in the 7-12, 12-19, and 20-29 age groups can relate the different activities engaged in by men and women in the community, as reported above.

Interestingly, we observed the absence of individuals over 50 years of age in the Sateré-Mawé. On the other hand, the age group of the study participants in the Tikuna ethnic group was similar to that observed in the Sateré-Mawé ethnic group, except that individuals older than 50 were also present. In the Tikuna ethnic group, the 7-12 (42% male and 58% female) and 20-29 (39% male and 61% female) age groups were predominant. The results different from those found here were observed in Tremembé¹³ and Tembê de Tomé-açu¹⁴ in the states of Ceará and Pará, respectively, in which age ranges from zero to 25 years old and from 35 to 45 years old 10 as well as from five to 19 years old prevailed.

Low educational levels were observed in both ethnic groups, with individuals with an educational level of complete elementary/middle school predominating in the Sateré-Mawé (21 people – 52.5%). This finding is most likely due to the geographic distance to the main city and the dependence of the regime of rivers for transportation. On the other hand, in the Tikuna, although there was a predominance of people with an educational level of incomplete elementary/middle school (34.7%), which is explained by the majority of the population being in the 7-12 age group, the

share of people with complete secondary education is 29.6%. The members of this community have easy access to high schools and college, which is not the case with the Sateré-Mawé community. These findings are in line with those already described in the literature. Menegolla et al.¹⁵ note that indigenous school education practices interculturality and bilingualism. In indigenous populations, precocious pregnancy occurs very commonly, which removes pregnant females from the classroom. Such factors could explain the predominance of complete or incomplete elementary/middle school educational level among community members.¹⁵

The WHO recommends that an ideal DMFT index should be less than 1.1 in the 12-year-old group. In both ethnic groups, an average DMFT value corresponding to 6.6, that is, a very high prevalence of caries among their members, was observed. In the Sateré-Mawé 7–12 age group, the mean DMFT index was 3.17, which the WHO considers a medium prevalence of caries.⁹ Such a finding might be due to the proximity and access to health services offered by the care network of the city of Manaus that the group's members have. The results similar to those observed in both ethnic groups were detected among the *Baniwa* indigenous people of the high Rio Negro in AM, whose mean DMFT index in the 12-year-old group was 6.0.²

The high percentage of “missing” teeth causes the older age groups to present high DMFT indices. As reported above, participants over 50 years of age were evaluated only in the Tikuna ethnic group, and they had a mean DMFT index of 21.8. Similar findings were reported by Carneiro et al.² in the *Baniwa* ethnic group, in which a mean DMFT index greater than 14 was observed in adults over 30 years of age and a mean DMFT index greater than 20.1 was observed in adults over 50 years of age.

The results observed in this study corroborate the observations of other researchers, namely, that the curative model of health care predominates in indigenous culture, to the detriment of preventive actions.^{2,16} According to Detogni,¹⁶ tooth loss is an event considered normal by the Xingu indigenous people. In general, under the guidance of the native chief (in Portuguese, *cacique*), community dwellers

prefer to remove the cause of pain rather than prevent decay or restore their teeth. They believe that tooth loss is a natural consequence of aging.²

There are no epidemiological data on the need for endodontic treatment in indigenous peoples in Brazil. This study sought to fill this gap by assessing the prevalence of this need in each of the ethnicities studied here. Among Sateré-Mawé members, 35.6% of the participants had a need for endodontic treatment. In turn, among the inhabitants of the Tikuna community, this index was 64.4%. Studies that have evaluated the need for endodontic treatment in different communities have found values that are much less expressive than those observed here. These values were 14%, 10.2%, and 23.2% in HIV-positive patients,⁴ in patients with sickle cell disease,⁵ and in patients undergoing bone marrow transplantation,⁶ respectively. In this study, the Sateré-Mawé ethnic group presented a higher prevalence of endodontic treatment compared to the Tikuna ethnic group, which can be explained by the great difficulty of access to dental health services and the absence of educational and preventive actions to promote oral health.

When correlating DMFT indices and endodontic treatment needs, a positive relationship between them was observed because as the DMFT index increases, the need for endodontic treatment also occurs. A significant difference was observed only in the DMFT of the TIKUNA ($p < 0.05$). In this ethnicity, a high number of decayed teeth and, consequently, a high final DMFT index were found. In the Sateré-Mawé ethnicity, no significance was found ($p > 0.05$); that is, the DMFT index did not influence the need for endodontic treatment. In turn, because this is the first study on the oral conditions of the Tikuna and Sateré-Mawé communities, it is impossible to understand the evolution of caries disease in these communities.

Finally, correlating the presence of comorbidities and the need for endodontic treatment, a single case of DM was observed in the group that presented the need for endodontic treatment in both ethnic groups. Some studies have demonstrated a high prevalence of periapical pathology among uncontrolled diabetic patients.^{17,18} However, the low prevalence of comorbidities in the evaluated communities does

not allow this study to demonstrate any correlation between the presence of comorbidities and the need for endodontic treatment.

Conclusion

The results of this study allow us to conclude that access to health services, the cultural values of the evaluated ethnic groups, and educational levels are detrimental to understanding the poor health conditions observed in the evaluated indigenous communities. They also make clear that the need for planning and implementing oral health actions based on education, health promotion, and caries prevention

is fundamental to comply with constitutional precepts that cherish human dignity, which have been neglected in Brazilian indigenous communities.

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