

## INVESTIGATION OF ORAL ALTERATIONS AND SEQUELAE IN INDIVIDUALS WITH HISTORY OF LEPROSY

## ALTERAÇÕES E SEQUELAS BUCAIS EM INDIVÍDUOS COM HISTÓRIA DE HANSENÍASE

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**Introduction:** Leprosy is a chronic, transmittable, debilitating disease and the oral cavity is a location for contamination by Hansen's bacillus. **Objective:** To investigate the occurrence of oral alterations and sequelae in individuals with a past and current history of leprosy in the municipality of Paulo Ramos, Brazil. **Methods:** A cross-sectional study was conducted with 36 individuals affected by leprosy in follow up in the Family Health Program (form of primary care) and with notifications registered with the Brazilian Disease Notification Information System. Descriptive statistics was performed. **Results:** In the sample, there was a predominance of individuals of the female sex (61,1%), with a mean age of 50.39 years, low purchasing power with a household income up to three times the Brazilian monthly minimum wage (97,2%) and no schooling (42%). Regarding clinical conditions, 38.9% were individuals with a past history and 61.1% had a current history of the disease, with the dimorphous type predominant in both groups. The analysis of oral status revealed marked situation of severe oral problems and the accumulation of treatment needs. None of the individuals examined had oral sequelae. **Conclusions:** The findings demonstrate absence of oral alterations and oral sequelae specifically related to *Mycobacterium leprae*. Only intraoral alterations related to caries and periodontal disease were found.

**Keywords:** Leprosy. Oral health. Complications

**Resumo**

**Introdução:** A hanseníase é uma enfermidade crônica, transmissível e incapacitante, sendo a cavidade bucal um local de contaminação do bacilo de Hansen. **Objetivo:** Investigar a ocorrência de alterações e sequelas bucais em indivíduos com história atual e pregressa da hanseníase no município de Paulo Ramos (MA). **Métodos:** Realizou-se estudo transversal com 36 indivíduos acometidos por hanseníase, acompanhados pela Estratégia Saúde da Família e com notificação registrada no Sistema de Informação de Agravos de Notificação (SINAN). Estatística descritiva foi realizada. **Resultados:** Na amostra do estudo, houve predominância de indivíduos do sexo feminino (61,1%), com média de idade de 50,39 anos, baixo poder aquisitivo com renda familiar até 3 salários-mínimos (97,2%) e ausência de grau de instrução (42%). Em relação à condição clínica, 38,9% eram indivíduos com história pregressa enquanto 61,1% representou o percentual de indivíduos com história atual da doença, sendo predominante em ambos os grupos a forma hanseníase do tipo dimorfa. A análise das condições bucais revelou acentuada severidade dos agravos bucais e acúmulo de necessidades de tratamento. Nenhum dos indivíduos examinados apresentou sequelas bucais. **Conclusão:** Os achados demonstram ausência de alterações orais e sequelas bucais relacionadas especificamente ao *Mycobacterium leprae*. Apenas alterações intraorais relacionadas a cáries e doença periodontal foram encontradas.

**Palavras-chave:** Hanseníase. Saúde bucal. Complicações.

**Introduction**

Leprosy, also known as Hansen's disease, is a transmittable, mutilating, debilitating condition, which, although treatable and curable, continues to be a worrisome public health problem due the fact that it is a chronic, infectious process that is strongly related to the social context<sup>1,2</sup>.

Leprosy causes deformities and is associated with orofacial conditions, the manifestations of which include tissue loss, which triggers disorders of a multidimensional nature<sup>3</sup>. Despite the oral manifestations of the disease generally emerge in an asymptomatic and insidious manner, monitoring these alterations decrease the incidence of injuries, disabilities and early loss of dental function<sup>4,5</sup>.

The oral cavity, along with the upper airways constitute as main routes of entry and exit of *Mycobacterium leprae*<sup>6</sup>. Therefore, the mouth is an important source of bacillary contamination<sup>6</sup>. Thus, knowledge on alterations stemming from infectious-contagious diseases is of the utmost importance to health professionals because the identification of lesions contribute as strategy for control and improve the care with a direct effect on quality of life of affected individuals<sup>7,8</sup>.

According to data from the Brazilian Health

Ministry<sup>9</sup>, the state of Maranhão represents the federative unit with the highest leprosy incidence rate. Therefore, as oral health should be a part of the integrality of health care and vigilance, the aim of the present study was to investigate oral alterations and sequelae in individuals with a past and current history of leprosy in the municipality of Paulo Ramos (MA), since elucidations on the oral alterations related to leprosy is essential from both the scientific and public health standpoints, as individuals with this disease constitute a high-risk group.

**Methods**

A cross-sectional study was conducted between March 2017 and February 2018 at primary care units in both urban and rural areas of the municipality of Paulo Ramos, which is located in the state of Maranhão, Brazil, characterized by a low Human Development Index and a medium endemicity coefficient for leprosy<sup>10</sup>.

The reference population was comprised of all individuals with a confirmed diagnosis of leprosy Residing in the municipality of Paulo Ramos in follow up by the

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teams of the Family Health Strategy. The inclusion criteria were individuals with a diagnosis of leprosy as well as individuals cured of leprosy. Pregnant women, cases of recurrent leprosy and patients with sequelae due to other systemic, degenerative or genetic alterations, those with congenital syndromes and those with diabetes were excluded from the study.

The extraoral examination involved an evaluation of areas of skin on the head, neck and limbs as well as the external peri-oral surface, lymphatic ganglia of the head and neck, skin of the upper and lower lips and the cutaneous-mucous line of the lip and commissures. The intraoral examination involved an evaluation of the labial mucosa and vestibular sulcus, labial portion of the commissures and oral mucosa, tongue, floor of the mouth, palate and alveolar ridge/gingiva<sup>11</sup>. Dental caries experience was determined using the decayed, missing and filled teeth (DMFT) index. Dental treatment needs were determined using the criteria proposed by Savassi *et al.*,<sup>12</sup>.

Training and calibration exercises were performed based on the pilot study, applying the Kappa coefficient to describe the agreement between the evaluators. The Kappa coefficient was 0.70 for caries, 0.80 for periodontal disease and between 0.70 and 0.75 for alterations of the mucosa, tongue, palate, peri-oral surface and lips.

The independent variables were demographic characteristics, socioeconomic characteristics, current and past history of leprosy, aspects related to leprosy, oral clinical conditions, oral needs, self-reported oral condition, use of dental services and hygiene habits. The dependent variables were extraoral and intraoral alterations and sequelae.

This study was authorized by the Paulo Ramos Municipal Secretary of Public Health and received approval from the Human Research Ethics Committee of Ceuma University (certificate number: 1471.833/2017).

**Results**

The sample was composed of 36 individuals, with females (61,1%) more affected by leprosy. Moreover, there was a predominance of individuals with a low purchasing power, earning up to three times the Brazilian monthly minimum wage (97,2%), with no schooling (41,6%) and who reported that their main occupation was the exercise of agricultural activities (50%). The most prevalent age for the occurrence of the disease was less than 41 years (81.8%) (Table 1).

**Table 1:** Demographic and socioeconomic distribution of individuals with current and past history of leprosy. Paulo Ramos/MA. Brazil, 2017

	CURRENT HISTORY OF LEPROSY		PAST HISTORY OF LEPROSY	
	n	%	n	%
<b>SEX</b>				
Female	12	54.5	10	45.5
Male	10	71.4	4	28.6

BMMW: Brazilian monthly minimum wage

	CURRENT HISTORY OF LEPROSY		PAST HISTORY OF LEPROSY	
	n	%	n	%
<b>AGE</b>				
< 41 years	9	81.8	2	18.2
41 TO 57 years	7	58.3	5	41.7
> 57 years	6	46.2	7	53.8
<b>INCOME</b>				
≤ BMMW	10	66.7	5	33.3
> 1 to 3 x BMMW	11	55.0	9	45.0
> 3 x BMMW	1	100.0	-	-
<b>SCHOOLING</b>				
None	8	53.3	7	46.7
≤ 8 years	7	53.8	6	46.2
> 8 years	7	87.5	1	12.5
<b>OCCUPATION</b>				
Student	3	100.0	-	-
Retired	8	53.3	7	46.7
Farm worker	11	61.1	7	38.9

In the overall sample, 81.8% of the individuals were diagnosed in the previous three months. A lack of sequelae was found in 40.0% of the paucibacillary individuals, 60.0% of the multibacillary individuals and 85.7% of those with a past history of leprosy. Regarding extraoral alterations, the feet were the site of the greater occurrence of leprosy lesions in multibacillary individuals (100.0%) and those with a past history of the disease (14.3%). Intraoral alterations were found in the buccal mucosa of a single paucibacillary individual (Table 2).

**Table 2:** Aspects related to the diagnosis, treatment, degree of disability, sequelae and location of alterations individuals with current and past history of leprosy. Paulo Ramos/MA. Brazil, 2017.

	CURRENT HISTORY OF LEPROSY				PAST HISTORY OF LEPROSY (CURED)	
	PAUCI-BA-CILLARY		MULTI-BA-CILLARY		n	%
<b>DIAGNOSIS</b>	n	%	n	%	n	%
≤ 3 months	06	33.3	12	66.7	10	71.4
4 months to 1 year	02	50.0	02	50.0	01	7.2
3 to 5 years	-	-	-	-	03	21.4
<b>TREATMENT</b>						
≤ 3 months	06	33.3	12	66.7	09	64.3
4 months to 1 year	02	50.0	02	50.0	02	14.3
3 to 5 years	-	-	-	-	03	21.4
<b>INTERRUPTION OF TREATMENT</b>						
Yes	01	25.0	03	75.0	04	28.6
No	07	42.1	11	57.9	10	71.4

	CURRENT HISTORY OF LEPROSY				PAST HISTORY OF LEPROSY (CURED)	
	PAUCI-BACILLARY		MULTI-BACILLARY			
<b>REACTIONAL EPISODES</b>						
None	08	42.1	11	57.9	10	71.4
Type I	-	-	01	100.0	04	28.6
Type II	-	-	02	100.0	-	-
<b>DEGREE OF PHYSICAL DISABILITY</b>						
Grade 0	02	20.0	08	80.0	05	35.7
Grade 1	05	62.5	03	37.5	05	35.7
Grade 2	01	25.0	03	75.0	04	28.6
<b>SEQUELAE</b>						
Yes	-	-	02	100.0	02	14.3
No	08	40.0	12	60.0	12	85.7
<b>LOCATION</b>						
<b>Extrabucal alteration</b>						
Feet	-	-	03	100.0	02	14.3
Leg	01	100.0	-	-	-	-
Hand	01	50.0	01	50.0	-	-
Face	-	-	01	100.0	01	7.1
Perioral region	-	-	-	-	01	7.1
Not applicable	06	40.0	09	60.0	10	71.4
<b>Intraoral alteration</b>						
Buccal mucosa	01	100.0	-	-	-	-
Not applicable	07	33.3	14	66.7	14	100.0

With regard to oral health status, 63.0% of the individuals with a current history and 37.0% of those with a past history of leprosy reported the absence of a toothache in the previous six months and 50.0% of the overall sample reported having been to a dentist in the previous year. Concerning oral hygiene, 55.6% and 44.4% of those with a current and past history of leprosy, respectively, reported never having received instructions or information on oral care (Table 3).

**Table 3:** Self-reported oral problems, use of dental services, oral hygiene habits, denture use and denture needs among individuals with current and past history of leprosy. Paulo Ramos/MA. Brazil, 2017.

	CURRENT HISTORY OF LEPROSY		PAST HISTORY OF LEPROSY	
	n	%	n	%
<b>TOOTHACHE IN PREVIOUS 6 MONTHS</b>				
Yes	05	55.6	04	44.4
No	17	63.0	10	37.0
<b>VISIT TO DENTIST</b>				
Yes	14	58.3	10	41.7
No	08	66.7	04	33.3

	CURRENT HISTORY OF LEPROSY		PAST HISTORY OF LEPROSY	
	n	%	n	%
<b>LAST VISIT TO DENTIST</b>				
Less than one year	02	50.0	02	50.0
1 to 2 years ago	04	66.7	02	33.3
3 or more years ago	16	61.5	10	38.5
<b>ORIENTATION ON ORAL HEALTH</b>				
Yes	07	77.8	02	22.2
No	15	55.6	12	44.4
<b>DIFFICULTY BRUSHING TEETH</b>				
Yes	03	75.0	01	25.0
No	19	59.4	13	40.6
<b>BRUSHING FREQUENCY</b>				
Once a day	05	62.5	03	37.5
Twice a day	10	58.8	07	41.2
3 times a day	07	70.0	03	30.0
4 times a day	-	-	01	100.0
<b>DENTAL FLOSS USE</b>				
Yes	01	50.0	01	50.0
No	21	61.8	13	38.2
<b>FREQUENCY OF DENTAL FLOSS USE</b>				
Once	01	50.0	01	50.0
Does not use	21	61.8	13	38.2
<b>DENTURE USE</b>				
None	15	71.4	06	28.6
Upper	-	-	02	100.0
Upper and lower	07	53.8	06	46.2
<b>DENTURE NEED</b>				
No	18	62.1	11	37.9
Upper	-	-	02	100.0
Upper and lower	04	80.0	01	20.0

The analysis of caries experience revealed a mean DMFT index of 23.08, with the missing component the most prevalent in all age groups in both the individuals with a current and past history of leprosy and a small number of filled teeth (mean: 0 to 1). No statistically significant differences were found regarding caries experience in the analyses comparing age groups and clinical condition (Table 4).

**Table 4:** Distribution DMFT index by age among individuals with current and past history of leprosy. Paulo Ramos/MA. Brazil, 2017.

AGE	CURRENT HISTORY OF LEPROSY								PAST HISTORY OF LEPROSY								p*			
	D		M		F		DMFT		D		M		F		DMFT		D	M	F	DMFT
	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)	M	(SD)				
< 41 years	8	5,6	6,2	8	0,7	1	15	9,8	6	2,8	13	15,5	1	1,4	20	14,1	0,78	0,13	0,5	0,53
41 a 57 years	6,1	5,4	15,2	12,1	0,1	0,3	21,5	7,6	3,6	3,7	22,4	9	-	-	26	5,7	0,52	0,44	0,22	0,06
> 57 years	1	1,6	27,1	8,8	0,5	1,2	28,6	7,2	3,2	6,1	25	12,3	-	-	28,2	8,5	0,71	0,63	0,6	0,97

D: decayed teeth. M: missing teeth. F: filled teeth. DMFT Index: Total components of decayed, missing and filled teeth. \* Kruskal Wallis

Severe oral problems and accumulated treatment needs were found in all age groups, with ON3 (caries without pulp involvement, grade I mobility) and ON4 (caries with pulp involvement, grade II mobility) found in 33.3%, 66.7% and 50.0% of the paucibacillary, multibacillary and cured individuals, respectively, less than 41 years of age. In individuals older than 57 years of age, ON5 (multiple treatment needs) accounted for the largest portion of the different groups: 25.0% of paucibacillary individuals, 75.0% of multibacillary and 57.1% of cured individuals (Table 5).

**Table 5:** Treatment needs in individuals with current and past history of leprosy. Paulo Ramos/MA. Brazil, 2017.

	CURRENT HISTORY OF LEPROSY				PAST HISTORY OF LEPROSY		
	PAUCIBACILLARY		MULTIBACILLARY		CURED		
LESS THAN 41 YEARS	n	%	n	%	n	%	
ON 1	-	-	-	-	-	-	
ON 2	-	-	-	-	-	-	
ON 3	2	33.3	4	66.7	1	50.0	
ON 4	1	33.3	2	66.7	1	50.0	
ON 5	-	-	-	-	-	-	
41 TO 57 YEARS	n	%	n	%	n	%	
ON 1	-	-	-	-	-	-	
ON 2	-	-	1	100.0	-	-	
ON 3	2	100.0	-	-	1	20.0	
ON 4	1	50.0	1	50.0	1	20.0	
ON 5	-	-	2	100.0	3	60.0	

	CURRENT HISTORY OF LEPROSY				PAST HISTORY OF LEPROSY	
	PAUCIBACILLARY		MULTIBACILLARY		CURED	
<b>&gt; 57 YEARS</b>						
ON 1	-	-	-	-	-	-
ON 2	1	100.0	-	-	-	-
ON 3	-	-	1	100.0	1	14.3
ON 4	-	-	-	-	2	28.6
ON 5	1	25.0	3	75.0	4	57.1

ON: oral needs; **ON 1:** Individuals with no dental needs; **ON 2:** Up to 3 teeth with caries without pulp involvement, presence of gingivitis and supragingival calculus; **ON 3:** 4 or more teeth with caries without pulp involvement, supra and subgingival calculus, grade I mobility; **ON 4:** Up to 3 teeth with caries with pulp involvement, supra and subgingival calculus, grade II, mobility, with or without gingival recession, need for extraction of 4 to 6 teeth due to caries or periodontal disease; **ON 5:** 4 or more teeth with caries with pulp involvement, supra and subgingival calculus, grade III mobility, with or without gingival recession, need for extraction of 7 or more teeth due to caries or periodontal disease, need for partial or complete denture.

### Discussion

The results reveal a predominance of the female sex in the overall sample, which is similar to the gender distribution of cases of leprosy reported by Almeida *et al.*,<sup>13</sup> in a study conducted in the city of Cacoal, Rondônia

State, Gomes *et al.*,<sup>14</sup> in a study conducted in the city of Fortaleza in the state of Ceará and by Lana *et al.*,<sup>15</sup> in a study conducted in the municipality of Governador Valadares in the state of Minas Gerais. However, Cortela; Ignotti<sup>8</sup>, Vieira *et al.*,<sup>16</sup> Duarte *et al.*,<sup>17</sup> and Santos *et al.*,<sup>18</sup> report a predominance of the male sex. Although the scientific literature indicates a greater incidence of the disease among males<sup>19</sup>, a previous study addressing the effects of leprosy in men and women demonstrated a growing trend in the number of women affected<sup>20</sup>.

The majority of individuals examined had a monthly income *per capita* denoting a situation of poverty as well as little or no schooling. These findings are in agreement with data described by Santana *et al.*,<sup>21</sup> in a study conducted in the municipality of Ariquemes in the state of Roraima and Almeida *et al.*,<sup>22</sup> in a study conducted in the city of Fortaleza (Ceará), demonstrating a predominance of low income and schooling among individuals with leprosy. Despite the social vulnerabilities of the sample studied, the majority of individuals had high adherence to regular treatment made available in a timely fashion.

Although the scientific literature reports the oral-maxillofacial region to be one of the anatomic sites affected by leprosy during the evolution of different forms of the disease<sup>23,24</sup>, no oral manifestations or deformities were found in the present sample. Therefore, the findings did not confirm the association between the clinical form of leprosy and oral alterations.

According to Russo *et al.*,<sup>25</sup> and Talhari *et al.*,<sup>26</sup> deformities indicate a late diagnosis and/or inadequate treatment. Therefore, the occurrence of a greater number of bacilli is indicative of greater impairment, lower cell immunity and greater diffusion of the disease, which increases the chances of the emergence of sequelae. With regard to intraoral alterations, this situation was not found in the present study, as the majority of individuals had received an early diagnosis and treatment.

The feet were the most affected part of the body in the present study, which differs from findings described by Miranzi *et al.*,<sup>27</sup> who report a greater number of visible lesions on the arms, face and hands. Regarding intraoral alterations, a lesion not specific to the disease was found in a single paucibacillary individual (inflammatory hyperplastic lesion on the buccal mucosa stemming from trauma due to denture use). Indeed, Pallagatti *et al.*,<sup>4</sup> credit the reduction in or absence of oral lesions specific to leprosy to the early diagnosis of skin lesions and the effectiveness of polychemotherapy.

A large number of individuals reported not having received orientation regarding oral health and oral hygiene. In addition, one perceives the occurrence of poor oral health care habits, favoring the establishment of oral problems that exert a further impact on the wellbeing of these individuals. Pereira *et al.*,<sup>28</sup> regarding brushing frequency and dental floss use, found a greater brushing frequency (three times a day) in a study conducted in the municipality of Parnaíba in the state of Piauí, but with no mention of the use of dental floss.

The inadequate oral hygiene and scarcity of orientation regarding oral health led to a high severity of dental caries and accumulated dental treatment needs, as demonstrated by the alarming DMFT index. These

results are similar to findings reported by Filgueira *et al.*,<sup>29</sup>. According to Rodrigues *et al.*,<sup>30</sup> is essential that individuals affected by leprosy have access to dental care to improve their oral health condition.

In agreement with the present findings, Souza *et al.*,<sup>31</sup> state that the oral health status of individuals with leprosy does not differ from that of the general population, indicating deficiencies in oral health promotion actions as well as difficulties in gaining access to treatment and health care. Corroborating this notion, Almeida *et al.*,<sup>32</sup> states that the participation of dentists in the care of individuals with leprosy is essential, as a dentist can play a fundamental role in counseling patients as well as addressing oral problems that could aggravate the disease.

The present investigation has limitations regarding the exploration and analysis of nonspecific or secondary conditions in individuals with a current or past history of leprosy. However, this aspect was not the objective of the study and therefore does not compromise validity of the results. To address this issue adequately, further studies are needed with a broader investigative scope.

The present findings demonstrate an absence of oral alterations and sequelae caused specifically by *Mycobacterium leprae* in the sample studied as well as no significant association between the clinical forms of leprosy and the occurrence of oral alterations/sequelae. Only intraoral alterations not specific to leprosy were found (caries and periodontal disease). The individuals analyzed had a precarious oral health status, with a high DMFT index and accumulated dental treatment needs. It is important for oral health to be included in the integrality of care, with the identification of dental needs and the inclusion of individuals affected by this disease by broadening access to healthcare services.

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