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## CLINICAL RESEARCH:

### Prevalence of Lesions and Oral Mucosal Normal Variations in an Elderly Population in Costa Rica

Prevalencia de lesiones y variaciones de lo normal en la mucosa oral en una población de adultos mayores de Costa Rica

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**ABSTRACT:** To establish the prevalence of oral mucosal lesions and normal variations in a population of older adults. This observational study was conducted from 2015 to 2016 and involved 156 participants from Los Guido (San José, Costa Rica). The participants' sociodemographic information, risk factors, comorbidity, and clinical examination were evaluated and analyzed descriptively and qualitatively. Findings in oral mucosa were found to preferentially affect women (n=111; 71%) and individuals between the ages of 60 and 69 years (n=65; 42%), having smoking as a risk factor (n=67; 43%), and suffering from arterial hypertension (n=101; 65%). Intraoral findings were mainly presented together with variations from normal and pathology (n=71; 46%), predominantly one variation from normal (n=67; 33%) and one pathology (n=51; 43%). The most prevalent normal variations were the saburral tongue, lingual varicose veins, and cryptic tonsils. Infectious diseases (n=33; 21%), potentially malignant disorders (n=30; 19%), and physical and chemical injuries (n=18; 12%) were the most prevalent groups. The four most predominant lesions were prosthetic stomatitis, actinic cheilitis, frictional keratosis, and atrophic glossitis. The differences in pathological groups were not statistically significant (p=0.392) when comparing the frequency ratio by sex. Variations of the normal anatomy are the predominant ones, the saburral tongue being the most prevalent individually; among the pathologies, the most remarkable group was the infectious diseases, and prosthetic stomatitis was the most frequent. The information



about this subject in Costa Rica is limited. So it is important to conduct more studies that contribute to the oral health of the elderly population in this area.

**KEYWORDS:** Oral cancer screening; Oral mucosa; Aging; Elderly; Oral lesions; Normal variations.

**RESUMEN:** Establecer la prevalencia de lesiones de la mucosa oral y variaciones de lo normal en una población de adultos mayores. Estudio observacional en 156 participantes de Los Guido (San José, Costa Rica) del 2015 a 2016. Se evaluaron y analizaron de forma descriptiva y cualitativa información sociodemográfica, factores de riesgo, comorbilidad y exploración clínica. Los hallazgos en mucosa oral afectaron preferentemente a las mujeres (n=111; 71%), el rango de edad entre 60 y 69 años (n=65; 42%) y con el tabaco como factor de riesgo (n=67; 43%) e hipertensión arterial (n=101; 65%). Los hallazgos intraorales se presentaron preferentemente de forma conjunta variaciones de lo normal y patologías (n=71; 46%), predominantemente una variación de lo normal (n=67; 33%) y una patología (n=51; 43%). Las variaciones de lo normal más prevalentes fueron lengua saburral, várices linguales y amígdalas criptodónticas. Las enfermedades infecciosas (n=33; 21%), los desórdenes potencialmente malignos (n=30; 19 %) e injurias físicas y químicas (n=18; 12%) fueron los grupos más prevalentes. Las cuatro lesiones más predominantes fueron estomatitis protésica, queilitis actínica, queratosis friccional y glositis atrófica. No hubo diferencia estadísticamente significativa ( $p=0.392$ ) al comparar la proporción de frecuencia por sexo. Las variaciones de la anatomía normal predominaron; siendo en forma individual la lengua saburral la más frecuente; de las patologías destacaron las enfermedades infecciosas principalmente la estomatitis protésica. Existe poca información en esta área en Costa Rica, es importante generar más estudios que permitan contribuir con la salud oral de la población adulta mayor.

**PALABRAS CLAVE:** Tamizaje de cáncer bucal; Mucosa oral; Envejecimiento; Lesiones orales; Variaciones de lo normal.

## INTRODUCTION

Human aging is a complex multifactorial process that leads to gradually deteriorating bodily functions, productivity, and psychological changes, as well as multiple diseases that inevitably end in death. However, certain lifestyle and behavioral modifications can help slow this decline and keep the body in the best possible state for its chronological age, commonly referred to as “healthy aging” (1).

By 2050, one in six people in the world (16% of the population) will be over 65 years old, compared with one in 11 people in 2019 (9%). The proportion of the population aged 65 and over is projected to double between 2019 and 2050; in 2018, for the first time in history, people aged 65 and over outnumbered children under five years old globally (2).

In Costa Rica, the population over 65 years of age constituted 6% of the total population in

2008 and 8.9% in 2020, and according to the population projections of the National Institute of Statistics and Censuses (INEC), it is estimated to reach 13% by 2030 and more than 20% in 2050 (3).

The oral cavity does not escape changes brought on by aging. Many of these changes are manifestations of pathologies such as immunological diseases, hematological disorders, or other diseases such as diabetes mellitus or nutritional deficiencies (4). Other changes may be associated with local factors such as the use of dentures, as frequently found in other studies (4,5). Most oral mucosal lesions are benign, the most common being fibrous hyperplasia (6,7); among malignant tumors, squamous cell carcinoma (SCC) is the most common pathology (8).

In recent years, research has been conducted worldwide on the epidemiological aspects of oral mucosal lesions (9,10); however, few studies have been carried out in Costa Rica (7,11-14).

A complete and systematic clinical oral assessment is essential for detecting any lesion or variation. This assessment must be performed in the same order in each of the evaluated patients to ensure that no findings are omitted, including palpation of nodes and review of each of the structures of the oral cavity, starting with the lips (15). All observations must be properly documented in the dental record per the legal requirements of each country (16,17).

In this context, the objective of the current study was to determine the prevalence of mucosal normal variations and lesions in a population of older adults from Los Guido de Desamparados (San José, Costa Rica), using the socio-demographic data in the period from 2015 to 2016.

## MATERIALS AND METHODS

### PARTICIPANTS

The research was conducted for the period from 2015 to 2016. Elderly people were selected by systematic random sampling with the participants' consent. A sample size was selected according to the convenience of the researchers. The inclusion criteria were patients aged 60 years or older from the Los Guido de Desamparados area of Costa Rica who had agreed to participate in the research. The exclusion criteria were patients who did not belong to the indicated area, refused to be examined, had a situation that prevented them from revealing their clinical history, or could not be examined.

### ETHICAL CONSIDERATIONS

The Scientific Ethics Committee of the University of Costa Rica (UCR) approved this descriptive observational study under project code B2335. The patients gave their free and informed consent in writing to participate in the study. The confidentiality and anonymization of the collected data were ensured.

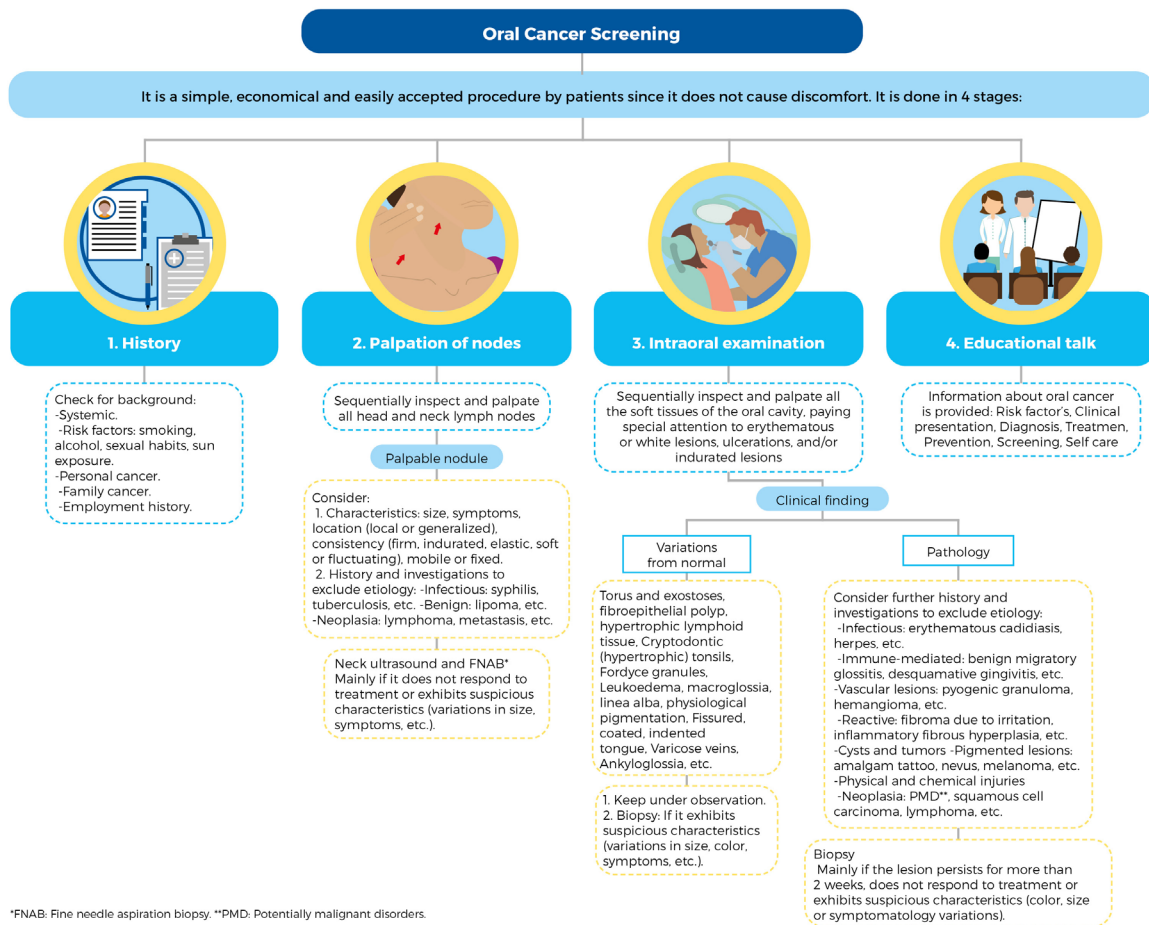
### DATA COLLECTION

According to the INEC-prepared census maps, a random area was selected within the Los Guido district to ensure that all communities had an equal chance of inclusion in the study. The study team registered and selected households in each community that met the inclusion criteria until the sample was complete. Those who agreed to participate were invited to the same location for an oral cancer screening, educational talk, and intraoral examination. The team also set up a mobile

clinic for history-taking, intraoral examination, and ganglion palpation (See Figure 1 for details).

The variables studied were age (completed years); sex of the patient (male, female); history of

cancer (personal and family); risk factors (tobacco, alcohol, and sexual practices); comorbidity (systemic diseases); and edentulism. For oral mucosal findings, variations from normal and pathologies according to Neville's classification were considered (18).



**Figure 1.** Diagram to carry out oral cancer screening. Source: self-made.

## STATISTICAL ANALYSIS

The data were entered in an Excel spreadsheet (Microsoft, Inc., Redmond, WA, USA). Inconsistencies were entered, corrected, and subsequently analyzed using descriptive statistics and the Chi-square test with the Stata 14 program (Statistical software package, Stata Corp). The significance level of the statistical difference was  $p\text{-value} < 0.05$ , with a confidence interval of 95%.

## RESULTS

A total of 156 patients were examined. Most of the participants were female (71%), 42% of them were between 60 and 69 years of age, 43% had smoking as a risk factor, 65% had reported a history of arterial hypertension, and 44% had diabetes mellitus as comorbidities. Additionally, 15% of the participants had palpable lymph nodes (Table 1).

**Table 1.** Distribution of sociodemographic variables (N = 156).

| Variable                   | N   | %   |
|----------------------------|-----|-----|
| <b>Sex</b>                 |     |     |
| Male                       | 45  | 29% |
| Female                     | 111 | 71% |
| <b>Age</b>                 |     |     |
| 60–69 years                | 65  | 42% |
| 70–79 years                | 59  | 38% |
| 80 years and over          | 32  | 21% |
| <b>History of cancer</b>   |     |     |
| Personal history of cancer | 5   | 3%  |
| Family history of cancer   | 12  | 8%  |
| <b>Risk factors</b>        |     |     |
| Alcohol                    | 7   | 4%  |
| Tobacco                    | 67  | 43% |
| Risky sexual practices     | 23  | 15% |
| <b>Comorbidity</b>         |     |     |
| Arterial hypertension      | 101 | 65% |
| Diabetes mellitus          | 69  | 44% |
| Asthma                     | 26  | 17% |
| Hypothyroidism             | 24  | 15% |
| Arthritis                  | 3   | 2%  |
| Gastritis                  | 15  | 10% |
| Anemia                     | 21  | 13% |
| Other                      | 49  | 31% |
| <b>Palpation of nodes</b>  |     |     |
| Yes                        | 24  | 15% |
| No                         | 129 | 83% |
| Not reported               | 3   | 2%  |

Source: self-made.

The intraoral examination findings most frequently found were both normal variations and pathology (46%): about 43% of the participants had only one variation from normal, while 33% exhibited one pathology (Table 2).

The most prevalent normal variations were saburral tongue (54%), lingual varicose veins (26%), and cryptic tonsils (15%). Pathologies were classified into 10 groups, of which infectious diseases (21%), potentially malignant disorders (PMD) (19%), and physical and chemical injuries

(12%) were the most prevalent. Individually, most findings comprised the diagnosis of prosthetic stomatitis (24 cases) comprised. The second- and third-most prevalent diagnoses in this study were actinic cheilitis (23 cases) and frictional keratosis (10 cases) and atrophic glossitis (10 cases), respectively (Table 3).

When comparing the frequency ratio by sex in these groups of lesions, the difference in the distribution for either group was not statistically significant ( $p=0.392$ ; Table 4).

**Table 2.** Frequency of findings in the intraoral clinical examination.

|                                    | N          | %   |
|------------------------------------|------------|-----|
| <b>Type of finding</b>             |            |     |
| None                               | 12         | 8%  |
| Normal variations                  | 55         | 35% |
| Pathological                       | 18         | 12% |
| Normal variations and pathological | 71         | 46% |
| <b>Number of variations</b>        |            |     |
| 1                                  | 67         | 43% |
| 2                                  | 48         | 31% |
| 3                                  | 11         | 7%  |
| <b>Number of pathologies</b>       |            |     |
| 1                                  | 51         | 33% |
| 2                                  | 31         | 20% |
| 3                                  | 7          | 4%  |
| <b>Total</b>                       | <b>156</b> |     |

Source: self-made.

**Table 3.** Frequency of variations from normal and oral lesions.

| Variable                                    | N          | %           |
|---------------------------------------------|------------|-------------|
| <b>Normal variations</b>                    |            |             |
| Torus                                       | 3          | 2%          |
| Fibroepithelial polyp                       | 0          | 0%          |
| Lingual varicosities                        | 40         | 26%         |
| Hypertrophic lymphoid tissue                | 0          | 0%          |
| Cryptic (hypertrophic) tonsils              | 23         | 15%         |
| Fordyce granules                            | 14         | 9%          |
| Leukoedema                                  | 4          | 3%          |
| Macroglossia                                | 0          | 0%          |
| Linea alba                                  | 0          | 0%          |
| Physiological pigmentation                  | 13         | 8%          |
| Fissured tongue                             | 13         | 8%          |
| Saburral (coated) tongue                    | 84         | 54%         |
| Ankyloglossia                               | 2          | 1%          |
| <b>Total</b>                                | <b>196</b> | <b>100%</b> |
| <b>Group of pathologies</b>                 |            |             |
| <b>Non-neoplastic proliferative lesions</b> | <b>11</b>  | <b>7%</b>   |
| Fibrous hyperplasia (traumatic fibroma)     | 5          | 3%          |
| Inflammatory fibrous hyperplasia (epulis)   | 6          | 4%          |
| <b>Potentially malignant disorders</b>      | <b>30</b>  | <b>19%</b>  |
| Actinic cheilitis                           | 23         | 15%         |
| Leukoplakia                                 | 6          | 4%          |
| Erythroplakia                               | 3          | 2%          |
| <b>Salivary gland lesions</b>               | <b>1</b>   | <b>1%</b>   |
| Mucocele                                    | 1          | 1%          |
| <b>Physical and chemical injuries</b>       | <b>18</b>  | <b>12%</b>  |
| Traumatic ulcer                             | 5          | 3%          |
| Frictional keratosis                        | 10         | 6%          |
| Petechiae and ecchymosis                    | 3          | 2%          |
| <b>Pigmented lesions</b>                    | <b>10</b>  | <b>6%</b>   |
| Melanotic macule                            | 7          | 4%          |
| Nevus                                       | 1          | 1%          |
| Smoker melanosis                            | 1          | 1%          |
| Amalgam tattoo                              | 1          | 1%          |
| <b>Infectious diseases</b>                  | <b>33</b>  | <b>21%</b>  |
| Erythematous candidiasis                    | 1          | 1%          |
| Denture stomatitis                          | 24         | 15%         |
| Median rhomboid glossitis                   | 5          | 3%          |
| Angular cheilitis                           | 4          | 3%          |
| Pseudomembranous candidiasis                | 2          | 1%          |



| Variable                          | N          | %           |
|-----------------------------------|------------|-------------|
| <b>Vascular lesions</b>           | <b>1</b>   | <b>1%</b>   |
| Hemangioma                        | 1          | 1%          |
| <b>Benign mesenchymal lesions</b> | <b>1</b>   | <b>1%</b>   |
| Lipoma                            | 1          | 1%          |
| <b>Periodontal disease</b>        | <b>5</b>   | <b>3%</b>   |
| Periodontal disease               | 5          | 3%          |
| <b>Unrated</b>                    | <b>19</b>  | <b>12%</b>  |
| Tonsillolith                      | 1          | 1%          |
| Nicotinic stomatitis              | 0          | 0%          |
| Atrophic glossitis                | 10         | 6%          |
| Aphthae                           | 4          | 3%          |
| Xerostomia (dry mouth)            | 2          | 1%          |
| <b>Total</b>                      | <b>134</b> | <b>100%</b> |

Source: self-made.

**Table 4.** Frequency by sex in the groups according to clinical diagnosis of oral pathologies.

| Group                                | N  | % total | Sex      |            | Half of age<br>(standard<br>derivation) |
|--------------------------------------|----|---------|----------|------------|-----------------------------------------|
|                                      |    |         | Male (%) | Female (%) |                                         |
| Non-neoplastic proliferative lesions | 11 | 7%      | 2%       | 9%         | 71                                      |
| Potentially malignant disorders      | 30 | 19%     | 11%      | 23%        | 73                                      |
| Salivary gland lesions               | 1  | 1%      | 0%       | 1%         | -                                       |
| Physical and chemical injuries       | 18 | 12%     | 7%       | 14%        | 77                                      |
| Pigmented lesions                    | 10 | 6%      | 9%       | 5%         | 73                                      |
| Infectious diseases                  | 33 | 21%     | 13%      | 24%        | 72                                      |
| Vascular lesions                     | 1  | 1%      | 2%       | 0%         | -                                       |
| Benign mesenchymal lesions           | 1  | 1%      | 2%       | 0%         | -                                       |
| Periodontal disease                  | 5  | 3%      | 7%       | 2%         | 73                                      |
| Unrated                              | 19 | 12%     | 11%      | 13%        | 73                                      |

\*\*Chi-square test  $p = 0.392$ .

Source: self-made.

## DISCUSSION

The aging of the population is considered one of the greatest challenges in the world; by 2030, it is estimated that all baby boomers will be over 65 years of age. Hence, knowing the etiological factors, pathogenesis, and coadjutant factors that determine the specificity of oral conditions in this age group is important (19).

The present study found that females exhibited oral mucosal findings more frequently than males did. Other studies in the literature have also reported this trend (20-23). This may be explained by the fact that multiple studies have found that women use health services more frequently than men do, which increases the possibility of detection, as observed in countries such as Brazil (24-26), Chile (27), Mexico (28), Italy (29), Poland (4), and Spain (30).

The most prevalent normal variations were saburral tongue and lingual varicose veins. Additionally, our study population had several causal factors reported in the literature. Saburral tongue has been associated with poor oral hygiene, dehydration, tobacco use, and alcohol consumption (31); the main systemic disease linked to Saburral tongue is arterial hypertension followed by diabetes mellitus, gastrointestinal disorders, and arthritis (32). Aging, smoking, and systemic diseases such as arterial hypertension, cardiovascular or cardiopulmonary diseases, and diabetes mellitus, have been associated with sublingual varicose veins (4).

Lesions associated with infectious diseases were the most prevalent group, affecting women more frequently; prosthetic stomatitis was the most common diagnosis in the entire sample, followed by different presentations of oral candidiasis (34) in several other countries according to a systema-

tic review (34). Notably, the aging process produces gradual, irreversible, and cumulative changes in the oral cavity, increasing its vulnerability to traumatic and infectious agents (35).

These lesions are influenced by changes in salivary function and oral microbiota, the quantity and composition of saliva change due to aging, systemic diseases, and medications used. Bacteria in older adults have been proven to change from being predominantly aerobic gram-positive to gram-negative over time. This transformation, along with changes in the mucosa, affects the immunological activity in the oral cavity, making it susceptible to infections by opportunistic microorganisms (19).

The second-most prevalent group in the lesions was PMD, clinically represented mostly by actinic cheilitis. Other studies have also reported these findings (21, 36), but this result is highly relevant as it has been concluded that the possibility of presenting with PMD and malignant lesions increases with age (33) and that retrospective studies have found SCC to be the most common lesion along with a high frequency of potentially malignant oral disorders (21, 37, 38).

Actinic cheilitis occurs between 4.6 to 43.2% of the worldwide population. Populations in tropical regions with excessive exposure to ultraviolet rays are at higher risk (39). A multicenter Spanish study showed that among the risk factors in the multivariate analysis were individuals being older than 60 years, having worked under sun exposure for more than 25 years, and having a history of skin cancer (non-melanoma) (40). The population studied in Los Guido exhibited these factors in the majority of cases.

The third-most prevalent diagnosis was frictional keratosis and atrophic glossitis, both of

which are reported as frequent findings in adult denture wearers in studies conducted in Poland (4), Chile (41), and Brazil (42). Atrophic glossitis is most likely a pernicious anemia manifestation (43). However, no hematological evidence supports this.

These findings are related to normal physiological processes during aging, in which the oral mucosa presents decreased elastic fibers and thinned and disorganized collagen fibers in the connective tissue, as well as decreased microvasculature. Due to these processes, the mucosa is less resilient and has reduced healing capacity and, with the previously mentioned microbiota changes, reduced immune response (19).

In this project, an educational talk was delivered to all participants in a community hall, and during the screening and assessment, the concepts of prevention and detection of oral cancer were explained to them individually. Previous studies have shown that patients receive more information from the media than from dental and medical professionals (44). Educational campaigns generate an increase in not only knowledge but also public awareness and thus early diagnosis (45).

In Costa Rica, a study conducted in 2004 showed that only 10% of the patients interviewed reported having undergone a head and neck examination by dental professionals, and an even lower percentage (9.7%) mentioned other oral tissues in the mouth being examined besides teeth and gums (46).

The presence of oral lesions is not always obvious and is not necessarily accompanied by symptoms, but many can be detected early through routine screening (47), including inspection and palpation of the neck and oral cavity

using a bimanual technique (48). This technique, in addition to being economical and simple, does not cause discomfort to patients (49). The World Health Organization recommends screening as it can reduce mortality in oral cancer patients (50).

Oral cavity examination should be routinely performed in older adults every year as a preventive measure that can reduce morbidity and mortality in this population (35). Screening also detects conditions that, although not malignant, can damage a patient's oral health, as in our case with prosthetic stomatitis, atrophic glossitis, and frictional keratosis. In short, knowing the normal variations of the oral mucosa avoids unnecessary procedures.

Developing specific oral health policies is necessary to address the needs of older adults with programs sustainable over time to allow this population to maintain adequate nutrition and detect lesions early (51).

The main limitation in this project was scheduling the visits as the hours of service had to be before noon because the community is at social risk and its location endangers the staff. Second, the lack of infrastructure at the site demanded the use of portable equipment in less-than-ideal conditions for data collection. Moreover, the health condition of many elderly people prevented them from moving, so the professional team had to visit their homes, which generated greater insecurity. Finally, the health condition of the participating population caused absenteeism at evaluation appointments, added to the multiple activities and functions of each researcher, and made it difficult to coordinate the dates together with the security conditions, which on some occasions forced the cancellation of the tours due to criminal acts or conflicts the day before.

The results of this study allow not only the Faculty of Dentistry of the UCR but also other public and private entities to design and program oral health activities aimed at the elderly population to reduce the risk factor for oral lesions, as well as to investigate, design, and evaluate the quality of life related to oral health for this population group that will inevitably increase in Costa Rica in the coming years.

## CONCLUSIONS

According to oral screenings performed on a population of older adults in Los Guido de Desamparados in Costa Rica from 2015 to 2016, this study found that the variations of normal anatomy were predominant, the saburral tongue being the most prevalent individually; among the pathologies, the most prevalent groups were the infectious diseases, while prosthetic stomatitis was the most frequent.

There is little information about this subject in Costa Rica; therefore, it is important to conduct more studies to contribute to the oral health of the elderly population.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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## AUTHOR CONTRIBUTION STATEMENT

Conceptualization: Y.V.B.O. and J.M.F.CH.  
Methodology: Y.V.B.O. and J.M.F.CH.  
Validation: Y.V.B.O. and J.M.F.CH.  
Formal analysis: Y.V.B.O. and J.M.F.CH.  
Investigation: Y.V.B.O. and J.M.F.CH.  
Resources: Y.V.B.O., J.M.F.CH., N.L.S. and C.M.M.  
Data curation: Y.V.B.O. and J.M.F.CH.  
Writing-original draft preparation: Y.V.B.O. and J.M.F.CH.  
Writing-review and editing: Y.V.B.O. and J.M.F.CH.  
Visualization: Y.V.B.O. and J.M.F.CH.  
Project administration: N.L.S.  
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All authors have read and agreed with the published version of the manuscript.

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