Prevalence of *candida* SSP in oral mucosa and dentures of institutionalized elderly

Prevalência de *candida* SSP na mucosa bucal e próteses de idosos institucionalizados

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ABSTRACT
Candida is usually an opportunistic fungal pathogen and can cause local and systemic mycoses in predisposed people, commonly affecting immunocompromised patients and those undergoing prolonged antibiotic treatment. About 150 species of Candida have been recognized, out of them C. albicans is one of the most pathogenic species and it causes candidiasis. The objective of this study was to evaluate the prevalence of Candida ssp in the oral mucosa and dentures of elderly residents in a philanthropic institution in Cascavel-PR. The sample consisted of 30 elderly people. The palatine mucosa and the upper prosthesis were scraped with swab, and in its absence, the recommended collection region was the tongue. Samples were seeded in CHROM ID agar Candida® to identify Candida ssp and incubated at 30ºC for 72 hours. The results were that 60% of the sample was positive. On the palate the growth in relation to the total sample was 23.33%, on the tongue 50% and on the total prosthesis 68.75%. Of the total sample, 11 patients (36.66%) had positive growth for two or more species, of these, 6 had C. albicans and C. glabrata as the most prevalent. It was observed that more than half of the sample presented growth of Candida ssp. Regarding the species found in this study, C. glabrata was the most prevalent species.

Keywords: oral candidiasis, dentures, candida glabrata.
amostra total foi de 23,33%, na língua 50% e na prótese total 68,75%. Do total da amostra, 11 pacientes (36,66%) tiveram crescimento positivo para duas ou mais espécies, destas, 6 tiveram C. albicans e C. glabrata como as mais prevalentes. Observou-se que mais da metade da amostra apresentou crescimento de Candida spp. Em relação às espécies encontradas neste estudo, C. glabrata foi a espécie mais prevalente.

Palavras-chave: candidíase oral, próteses dentárias, candida glabrata.

1 INTRODUCTION

The significant increase in the population over 60 years of age led to a marked demographic change in Brazil in the late twentieth century. Thus, new social, health, economic, and emotional demands emerged (Paula et al., 2014). In this sense, long-stay institutions help those who have no family support for daily care, as well as when the family has no structure, either financial or emotional, to care for the elderly at home (Alves-Silva et al., 2013).

Studies show that institutionalized elderly gradually lose the bond with relatives and friends, deteriorating the general health status with direct implications on the conditions of the oral cavity. The oral mucosa of the elderly undergoes changes in resistance, arising from aging, making it more vulnerable to desquamative ulcerative, lichenoid and vesicular lesions (Beloti et al., 2011; Ossa et al., 2022).

Infections caused by Candida spp are common in elderly patients, especially in institutionalized patients, because of the model of care. Advancing age is an important factor, as several other conditions appear along with aging, such as use of total prosthesis, systemic diseases, immunosuppression, medication use, xerostomia, etc (Resende et al., 2006; Wong et al., 2019).

Candida is generally an opportunistic fungal pathogen and can cause local and systemic mycoses in predisposed people, commonly affecting immunocompromised patients and those undergoing prolonged antibiotic treatment. About 150 Candida species have been recognized, among them C. albicans is one of the most pathogenic species causing candidiasis (Hesari, Emmamzadehhashemi, & Aboutaleb, 2023).
According to Melo et al. (2013) in relation to total or partial dentures, they are considered factors that cause aggression to the oral mucosa. In addition, the author mentions that approximately 60% of the elderly who use prostheses show some inflammatory process caused by fungi of the genus *Candida*.

Oral candidiasis, popularly known as thrush, is characterized by the appearance of isolated or grouped white plaques adhered to the mucosa, being membranous and sometimes surrounded by an erythematous halo. The best known species commonly linked to pathological states is *Candida albicans*, however, other species such as *C. glabrata* and *C. tropicalis* are frequently found (Melo, 2014; Sonawane, 2022).

According to Melo et al. (2014) *C. glabrata* usually appears on acrylic surfaces and the mucosa of the palate, and is currently associated with high mortality rates, and in North American and European countries it is considered the main non *albicans* species associated with pathological processes. The same author also mentions that in Brazil, *C. tropicalis* has been occupying this position. The study by Leite et al. (2015) corroborates the author, when his results show that *C. tropicalis* was the second most prevalent in mucosa and prostheses, second only to *C. albicans*.

Assuming that one of the most frequent forms of superficial candidiasis is oroesophageal candidiasis due to the use of prostheses, it is necessary to pay attention to the incidence of systemic pathological processes related to *C. albicans*, *C. glabrata* and *C. tropicalis*, called candidemia, which has the second highest incidence in the elderly, only surpassed by newborns (Melo et al., 2014). The purpose of this study was to evaluate the prevalence of *Candida* ssp in the oral mucosa and dentures of elderly residents in a philanthropic institution.

2 MATERIAL AND METHODS

2.1 SAMPLE

The sample involved 30 elderly individuals (men and women) living in a philanthropic facility in Cascavel/PR. The study participants were divided into two groups:
2.3 COLLECTION OF BIOLOGICAL MATERIAL

Biological samples from group 1 were collected from the surface of the denture and palate, and from group 2, from the tongue and palate, both using sterile SWAB. The collected material was introduced into 15 mL microcentrifuge tubes containing 0.5 mL of phosphate buffered saline (PBS) to keep the sample alive until taken to the laboratory for culture.

2.4 ISOLATION AND IDENTIFICATION OF MICROORGANISMS

The tubes were shaken for 20 seconds to achieve homogeneity. A 0.1 mL aliquot of the sample was removed from each tube and plated on selective solid culture medium - CHROM ID Candida agar (Difco) for isolation of Candida species.

According to the manufacturer, the CHROM ID agar Candida medium identifies up to 5 different species corresponding with the color of the colony. Therefore, colonies of C. albicans are green; of C. glabrata are pink with a clear halo and regular borders, of C. krusei are pink with irregular borders, C. tropicalis are blue, C. parapsilosis are purple. After plating the plates were incubated at 30°C in aerobiosis for 72 hours. And then visually evaluated by growth of colonies.

2.5 PARANAENSE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

This study was reviewed and approved by the Paranaense University Human Research Ethics Committee under CAAE number 49973915.0.0000.0109. Individuals who agreed to participate in the study signed an informed consent form, authorizing the clinical examination and collection of biological samples.

3 RESULTS

Of the 30 elderly people analyzed, 16 (53.33%) were female and 14 (46.66%) were male. The ages ranged from 60 to 104 years. The sample was classified as "negative" when no yeast growth was observed in the growth medium incubated at 30°C for 72 hours.
Considering that in the elderly who did not use total prosthesis the recommended regions were palate and tongue, through the analysis of all individuals and all collection sites, 18 (60%) had a positive result (Figure 1).

Figure 1. Prevalence of Candida spp in all individuals and all collection sites.

Source: the authors (2023).

The Prevalence of Candida spp in the collection sites was 43.33% for Candida glabrata, 36.66% for C. albicans, 16.66% for C. Krusei, 10% for C. tropicalis and 6.66% for C. parapsilosis (Figure 2).

Figure 2. Prevalence of Candida spp in all individuals and all collection sites.

Legend: Data expressed in percentage (%).

Source: the authors (2023).
Thus, we observed that the most prevalent species were *C. glabrata* and *C. albicans*. From the total sample, 11 patients (36.66%) had positive growth for two or more species, 6 of them had the most prevalent species mentioned above.

Considering the prosthesis users (n=16), 11 of them presented yeast growth (68.75%). The prevalence of *C. albicans* in the total sample was 56.25%, *C. glabrata* 31.25%, *C. parapsilosis* 12.5% and *C. tropicalis* 6.25%, as well as *C. krusei* (Figure 3).

![Figure 3. Prevalence of Candida spp in the total denture wearers (n=16).](image)

Of the total palate sample (n=30) 23.33% showed growth of *Candida* yeasts. Of the 30 patients analyzed, *C. albicans* was the most prevalent (20%), followed by *C. glabrata* (16.66%), *C. Krusei* (6.66%) *C.tropicalis* (3.33%) (Figure 4).
On the tongue, 7 of 14 patients showed positive growth (50%). Also in relation to the total sample, *C. glabrata* was found in 50%, after *C. albicans*, *C. tropicalis* and *C. krusei*, both in 14.28% of the sample (Figure 5).
4 DISCUSSION

The collection regions selected for the study were the palate and the upper total prosthesis. This choice is justified due to the fact that the surface of the prosthesis, as well as the tissues that are in contact with them are more susceptible to fungal colonization, because the high concentration of proteins in saliva forms a film between the base of the prosthesis and the oral mucosa, creating a favorable environment for this adherence (Guimarães, 2008). In the elderly who did not use the prosthesis, the region selected for collection was the tongue. Some studies report that *Candida glabrata* in the oral cavity increased with age, and this increase seems to be independent of the use of dental prosthesis (Neppelenbroek et al., 2009). Sharma et al. (2016) concluded that a variety of microorganisms are present in denture biofilm.

In the present study 18 individuals (60%) had *Candida* growth in the oral cavity (palate, tongue and/or total dentures). Using the same collection sites, D’Avila (2006) conducted a study in which the test group had positive growth in 62.8% of the samples collected. In addition, in the research conducted by Resende et al. (2006) 55.15% of the sample had *Candida* yeast growth. Our results corroborate the results of these studies.

The non *albicans* species isolated in this study were *C. tropicalis*, *C. parapsilosis*, *C. glabrata* and *C. krusei*. Although *C. albicans* is the most frequent species in fungal infections the incidence of infections caused by non *albicans* *Candida* species, such as those mentioned above, is increasing and may be associated with mortality (Malani et al., 2011).

Of the total sample in this study, 36.66% showed positive growth for two or more *Candida* ssp, with the most frequent association being that of *C. albicans* and *C. glabrata*, corroborating with Malani et al. (2011). Associations between different types of species are common, and are a factor that can hinder the treatment of fungal infections (Melo et al., 2013).

In the samples collected from the palate the most prevalent growth was of *C. albicans*, followed by *C. glabrata*, *C. krusei* and *C. tropicalis*. The study by Senna (2012) showed similar results, in which *C. albicans* also showed the highest growth, followed by *C. glabrata*, *C. tropicalis*, *Candida* sp. and *C. krusei*. 
Malani et al. (2011) reports in his study that 70.2% of prosthesis samples showed yeast growth, with *C. albicans* and *C. glabrata* being the most prevalent, corroborating with this study that showed 68.75% of positive samples for the prosthesis region and also had these species as the most frequent.

This study showed that *C. glabrata* and *C. albicans* were the most prevalent in the tongue region, and also that 50% of the total sample had positive growth. In the study by D'Avila (2006), *C. albicans* was the most frequent found in the test group, followed by *C. tropicalis*. Malani et al. (2011) reported that they found *Candida* yeasts in 45.9% of the sample.

Similar to this study, in the results by Malani et al. (2011) the amount of *C. glabrata* growth varied between different sites in the mouth. D'Avila (2006) reported that *Candida* spp. is not uniformly distributed in the oral cavity. This may explain different detections of *Candida* ssp in the collection regions, explaining uneven results between collection regions and between different studies.

According to a study by Malani et al. (2011) *C. glabrata* was common in patients hospitalized or residing in long-term care facility, and the yeast was detected only in individuals over 60 years of age. Therefore, it is assumed that advancing age increases the risk of *Candida* yeast infections because the elderly have predisposing factors for this colonization, such as disease onset, reduced salivary flow, wear of dentures, among others (Ossa, Soegyanto, & Sasanti, 2022).

The results of the present study are similar to those of Loster et al (2016) who demonstrated that the frequency of fungal infection in prostheses seems to be influenced by age and gender, being more common in patients with total prostheses over 50 years old, an age range much younger than the youngest patient in the group we evaluated (60 years old).

Considering the importance of treating oral fungal infections to prevent candidemia, including pneumonia, adequate treatment is essential, especially in elderly patients. It is important to emphasize that the elderly usually take several medications and that the risk of interaction becomes high.

Thus, the search for alternative methods of treatment is a constant. Among the options we have to consider the use of medicinal plants and phytotherapics,
which have already been proven effective in the treatment of fungal infections. Among the plants that stand out with this function we can mention cinnamon, rosemary, pomegranate, basil, calendula, mastic, oregano, among others (Raimundo & Toledo, 2016).

5 CONCLUSION

Based on the results obtained, it can be concluded that more than half of the elderly patients evaluated in this study had some Candida species on the oral mucosa or total prosthesis. It was observed that the most prevalent species considering all collection sites was C. glabrata, proving that the incidence of non-Albicans species has been increasing in recent years. Therefore, further studies on the subject are necessary.
REFERENCES


