

# Oral candidiasis: A retrospective study of 276 Brazilian patients

Henrique Cortes Meira, Bruna Mascarenhas De Oliveira, Igor Figueiredo Pereira, Marcelo Drumond Naves, Ricardo Alves Mesquita, Vagner Rodrigues Santos

Department of Clinical, Pathology and Surgery, School of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil

## Abstract

**Background:** Although oral candidiasis (OC) is a very common fungal infection of oral cavity, clinical features of affected patients and their demographic profile are not well documented.

**Objective:** The objective of the study was to assess the demographic profile of patients diagnosed with OC and its clinical features in an import Brazilian center of oral and maxillofacial pathology.

**Materials and Methods:** A retrospective study consisted of 276 patients diagnosed with OC by cytopathology Periodic Acid-Schiff (PAS) staining, during the period of 20 years. The variables related to patients were gender, age and skin color. Regarding infection, the data collected were location, color, symptoms, early manifestation, or recurrent and associated factors.

**Results:** Male and female were equally affected, and the median age was 43 years. The majority of lesions were of primitive origin, asymptomatic and affecting only one site of oral cavity. The most affected site was the palate followed by tongue. More than a half of the patients (56.2%) had red lesions. The main associated factors related were the use of removable prostheses, bone marrow transplantation and AIDS.

**Conclusions:** OC affects predominantly adults and elderly, without difference between sex and skin color. Although clinical findings are crucial, cytopathology tests are important complementary examinations to reach a definitive diagnosis. PAS staining seems to be more used in cases of erythematous candidiasis since white lesions are easier to diagnose clinically.

**Keywords:** Epidemiology, oral candidiasis, retrospective study

**Address for correspondence:** Dr. Vagner Rodrigues Santos, School of Dentistry, Minas Gerais Federal University, Avenida Antônio Carlos, 6627, Campus Pampulha, CEP 31270-901, Belo Horizonte, Minas Gerais, Brazil.

E-mail: vegneer2003@yahoo.com.br

**Received:** 30.01.2017, **Accepted:** 23.08.2017

## INTRODUCTION

Oral candidiasis (OC) is a very common fungal infection of oral cavity. It is caused by yeast of the genus *Candida* spp. and *Candida albicans* is the most virulent and most commonly involved species.<sup>[1,2]</sup>

The transformation from commensal to the pathogen type happens when there are conditions that favor their growth. OC affects predominantly the elderly, infants, users of

removable prostheses, patients undergoing the prolonged use of antibiotics and corticosteroids, chemotherapy or radiotherapy of the head and neck, individuals with xerostomia and those with immunological deficiency such as acquired immunodeficiency syndrome (AIDS).<sup>[3]</sup>

Clinically, they can be divided into white and erythematous according to their color characteristics. The white form is represented for pseudomembranous and hyperplastic

### Access this article online

#### Quick Response Code:



#### Website:

www.jomfp.in

#### DOI:

10.4103/jomfp.JOMFP\_77\_16

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** Meira HC, De Oliveira BM, Pereira IF, Naves MD, Mesquita RA, Santos VR. Oral candidiasis: A retrospective study of 276 Brazilian patients. J Oral Maxillofac Pathol 2017;21:351-5.

candidiasis. Erythematous includes acute atrophic candidiasis [Figure 1], denture stomatitis [Figure 2], median rhomboid glossitis [Figure 3], angular cheilitis and linear gingival erythema. In addition, there are three forms of OC not included into this classification: chronic mucocutaneous candidiasis, cheilocandidiasis and chronic multifocal candidiasis.<sup>[4]</sup>

The diagnosis is fundamentally clinical, but in many cases, complementary tests are necessary: direct microscopy, cell culture, genetic tests such as polymerase chain reaction and biopsy. Among these, the direct microscopy examination of the material obtained through the superficial scraping of the lesions is outstanding. The technique does not differentiate the species of *Candida* spp., but it is a simple and low-cost alternative widely used, with emphasis on staining Periodic Acid-Schiff (PAS) [Figure 4].<sup>[5,6]</sup>

Although it is a common disease, clinical features of affected patients and their demographic profile are not well

documented, since in many cases, the events go unnoticed by the physician.<sup>[4]</sup>

The aim of this study was to assess the demographic profile of patients diagnosed with OC and its clinical features in an import Brazilian center of oral and maxillofacial pathology.

## MATERIALS AND METHODS

### Study design and data collection

This is an observational and retrospective study. The sample consisted of 276 patients diagnosed with OC in the Laboratory of Oral and Maxillofacial Pathology of the Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil, in the period 1994–2014. Belo Horizonte is the capital of the state of Minas Gerais located in the southeast region of the country and considered one of the main Brazilian cities. The referred laboratory is an important diagnostic center



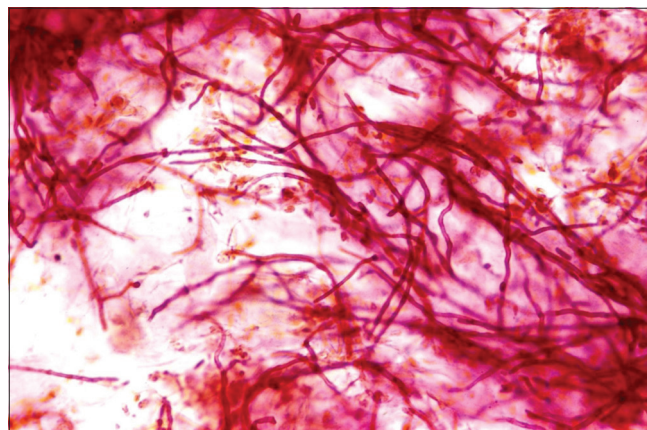
**Figure 1:** Clinical image shows acute atrophic candidiasis: Erythematous lesions in palate. (by Prof. Dr. Marcelo Drumond Naves)



**Figure 2:** Clinical image shows denture stomatitis: Erythematous oral candidiasis in alveolar ridge and palate due to the use of removable prosthesis (by Prof. Dr. Marcelo Drumond Naves)



**Figure 3:** Clinical image shows median rhomboid glossitis: Central papillary atrophy, located in the center of the tongue (by Prof. Dr. Ricardo Alves Mesquita)



**Figure 4:** Histopathological image shows exfoliative cytology of the oral mucosa. Appearance of pseudohyphae and yeasts of *Candida albicans*. Periodic acid-Schiff stain, (×100) (by Prof. Dr. Ricardo Alves Mesquita)

in the area and meets the demand for histopathological examinations of the public and private services, being a reference in the area.

All cases were diagnosed by cytopathology method PAS, a standardized staining method used in this laboratory since 1994, for diagnosis of OC.

The data were collected from the records of histopathological examinations. The variables collected related to patients were gender, age and skin color. Regarding infection, the data collected were location, color, symptoms, early manifestation, or recurrent and associated factors.

**Ethical aspects**

This study received approval from the Human Research Ethics Committee of Federal University of Minas Gerais (Belo Horizonte, MG, Brazil) according to the resolution 466/12 of the Brazilian National Health Council (CNS), which deals with ethics in research involving humans.

**Statistical analysis**

Data were entered and tabulated using SPSS (Statistical Package for the Social Sciences) version 22.0. The study variables were analyzed by descriptive statistics: absolute and percentage values and means and standard deviations.

**RESULTS**

A total of 276 patients were diagnosed with OC, by cytopathology (PAS staining), from January 1994 to December 2014. Most patients were female (52%) and had a median age of 43 years, which ranged from 3 months to 85 years. Table 1 summarizes the distribution of the age of patients with OC. The distribution of patients according to the color of the skin was Caucasian (42%), mixed race (34%) and Black (21%) (missing data: 3%).

Regarding the distribution and location of the lesions, 200 were reported in only one site of the oral cavity, whereas 72 individuals had the infection in multiple sites of the mouth (missing data: 4). The most affected site, including single or multiple lesions, was the palate (52.9%), followed by tongue (43.4%) and oral mucosa (14.7%) [Table 2].

The clinical characteristics of lesions according to the color are shown in Table 3. More than a half of the patients (140, 56.2%) had red lesions followed by white (28.5%). Thirty-seven (14.9%) patients had red and white appearance in the same lesion.

The majority of lesions were of primitive origin (193, 75.0%), whereas 64 (25.0%) were recurrent lesions (missing data: 19 patients). Regarding the painful symptoms, 136 (66.0%) of patients had no complaints and 70 (34.0%) patients reported discomfort related to the lesion (s). However, in 70 of the chips, information was not recorded.

Additional information about associated factors was related in 71 cases, and in four of them, there was more than one factor. Local risk factors (removable prostheses) and systemic (bone marrow transplantation and HIV/AIDS) were observed [Table 4].

**Table 1: Age distribution of patients with oral candidiasis**

Age	n (%)
0-10	4 (1.5)
11-20	9 (3.4)
21-30	32 (12.1)
31-40	72 (27.2)
41-50	62 (23.4)
51-60	48 (18.1)
61-70	18 (6.8)
>70	20 (7.5)
Total	265 (100)

Note: Missing data=11

**Table 2: Location and distribution of oral candidiasis lesions (n=272)**

	Single lesions	Multiple lesions	Total (%)
Palate	92	52	144 (52.9)
Tongue	75	43	118 (43.4)
Oral mucosa	12	28	40 (14.7)
Alveolar ridge	6	9	15 (5.5)
Gum	6	5	11 (4.0)
Oropharynx	2	7	9 (3.3)
Labial commissure	5	3	8 (2.9)
Lips	2	4	6 (2.2)
Mouth floor	0	2	2 (0.7)

Note: Missing data=4

**Table 3: Clinical appearance of oral candidiasis according to the color**

Colors of lesions	n (%)
Red	140 (56.2)
White	71 (28.5)
Red and white	37 (14.9)
Similar to oral mucosa	1 (0.4)
Total	249 (100)

Note: Missing data=27

**Table 4: Associated factors to oral candidiasis**

Risk factors	n (%)
Removable prostheses	36 (47.4)
Bone marrow transplantation	19 (25.0)
HIV/AIDS	11 (14.5)
Chemotherapy	5 (6.5)
Diabetes mellitus	3 (4.0)
Use of corticosteroids	2 (2.6)
Total	76 (100)



## DISCUSSION

This study determines the profile of patients with OC in an important oral pathology laboratory in a period of 20 years. In addition to clinical examination, all the cases of this study had the final diagnosis by the cytopathology with PAS. Although some authors defend that the diagnosis of OC is fundamentally clinical, others suggest that the diagnosis of candidiasis should be based on the signs, symptoms and microbiological findings.<sup>[5,6]</sup> In this study, only data from patients submitted to histopathological analysis were evaluated. Although it does not represent all the cases treated in the service, since many cases are not sent to the laboratory, the sample shows the characteristics of the disease in these individuals.

In this study, male and female were equally affected, different from a similar study where women were affected 3.5 times more by OC. The authors attribute this predilection to women by the greater number of women attended or to the use of the removable prosthesis by them.<sup>[7]</sup> The infection was present in different age groups and it was uncommon in young patients. A previous study also reported that adults and elderly were the most affected by the disease. A probably explanation, for adults and elderly be more affected by OC, is due to the presence of risk factors in these age groups.<sup>[7]</sup>

In a previous study evaluating the oral cavity mycobiome of healthy patients, *Candida* species were the most prevalent.<sup>[8]</sup> However, some risk factors and conditions can favor their growth such as the use of removable prostheses, immunosuppressive conditions such as AIDS, diabetes mellitus, history of chemotherapy/radiotherapy in head and neck tumors, use of corticosteroids, smoking and xerostomia. Elderly and infants are also more susceptible.<sup>[9-11]</sup>

The presence of associated factors was not mandatory in the charts sent to the present laboratory, and consequently, only a few examinations had this information. However, as in previous studies, the following risk factors were reported: use of removable prostheses,<sup>[12]</sup> bone marrow transplantation,<sup>[13]</sup> HIV/AIDS,<sup>[3,14]</sup> chemotherapy,<sup>[13,15]</sup> diabetes mellitus<sup>[16]</sup> and use of corticosteroids.<sup>[17]</sup>

In relation to clinical presentation, the results of this study suggest that erythematous candidiasis was the most frequent form; since more than 50% of patients, the color of lesions was exclusively red and the most affected sites were palate and tongue. The erythematous form of the disease presents clinically as a poorly defined

reddish area in the oral mucosa, without the presence of white plaques, most commonly found on the tongue and palate.<sup>[4]</sup>

The white lesions were the second most frequent color, suggesting the pseudomembranous candidiasis. This is the classic presentation of the disease, characterized by the presence of detachable white plaques commonly found in the tongue, buccal mucosa, hard palate, soft palate and oropharynx.<sup>[4]</sup>

The prevalence of red over white lesions also suggests that cytopathology (PAS staining) seems to be used in cases of erythematous candidiasis since white lesions are easier to diagnose clinically. This confirms that erythematous candidiasis is the most common clinical form although white lesions are most reported by the clinician.<sup>[18]</sup>

The lesions on palate were the most prevalent and are suggestive of denture stomatitis. This is a very common type of OC in users of inappropriate, poorly sanitized and maladaptive prostheses. They are erythematous lesions, edematous and restricted to the area of contact with the prostheses. It is usually asymptomatic, but patients may complain of burning in the mouth. Its clinical signs can be only punctual petechial hemorrhages and inflammation, until erythema and papillary hyperplasia of the oral mucosa in contact with the prostheses.<sup>[12]</sup>

Most of the patients of this study reported that the injuries were primitive and the cases of recurrence probably may be associated with the permanence of local and systemic associated factors. An important aspect of treatment should be the identification and removal of local and systemic predisposing factors, in addition to choosing the correct antifungal drugs.<sup>[19]</sup>

These lesions are typically asymptomatic, as in most cases reported. In symptomatic patients, the main problems are burning, dysphagia, bleeding, pain, halitosis and dry mouth.<sup>[11]</sup>

OC is often treated as innocuous or harmless conditions, but in many circumstances, it should be viewed as a serious injury both from a taxonomic and therapeutic point of view.<sup>[20]</sup> Increasing mortality rates caused by candidemia in Brazil, emphasizes the need for improving local practices of clinical management, including early diagnosis, source control and precise antifungal therapy.<sup>[21]</sup> It is very important that physicians and dentists know its various clinical manifestations and associated factors, since it may be the first manifestation of a local or systemic disorder.

## CONCLUSIONS

In a period of 20 years, OC was found predominantly in adults and elderly and was not found difference between sex and skin color. The red coloration of the lesions was more prevalent, suggesting the erythematous form of the disease. The palate and tongue were the most affected sites in both single and multiple lesions. In addition, the majority of cases were primary onset and asymptomatic. Although clinical findings are crucial in OC, cytopathology tests are important complementary examinations to reach a definitive diagnosis.

## Acknowledgments

The authors thank all the staff of the Laboratory of Maxillofacial Pathology of School of Dentistry/UFGM, especially to Domenico Romano, for their support in the file documents search.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Lynch DP. Oral candidiasis history, classification, and clinical presentation. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1994; 78:189-193.
- Muadcheingka T, Tantivitayakul P. Distribution of *Candida albicans* and non-albicans *Candida* species in oral candidiasis patients: Correlation between cell surface hydrophobicity and biofilm forming activities. *Arch Oral Biol* 2015;60:894-901.
- Guidelines on the Treatment of Skin and Oral HIV-Associated Conditions in Children and Adults. World Health Organization (WHO); 2014.
- Millsop JW, Fazel N. Oral candidiasis. *Clin Dermatol* 2016;34:487-94.
- Coronado-Castellote L, Jiménez-Soriano Y. Clinical and microbiological diagnosis of oral candidiasis. *J Clin Exp Dent* 2013;5:e279-86.
- Marty M, Bourrat E, Vaysse F, Bonner M, Bailleul-Forestier I. Direct microscopy: A Useful tool to diagnose oral candidiasis in children and adolescents. *Mycopathologia* 2015;180:373-7.
- Araújo RR, Rezende AP, Araújo MB, Capistrano HM. Oral candidiasis profile in a clinic of stomatology. *Arqu Bras Odontol* 2006;2:26-31.
- Ghannoum MA, Jurevic RJ, Mukherjee PK, Cui F, Sikaroodi M, Naqvi A, *et al.* Characterization of the oral fungal microbiome (mycobiome) in healthy individuals. *PLoS Pathog* 2010;6:e1000713.
- Akpan A, Morgan R. Oral candidiasis. *Postgrad Med J* 2002;78:455-9.
- Singh A, Verma R, Murari A, Agrawal A. Oral candidiasis: An overview. *J Oral Maxillofac Pathol* 2014;18:S81-5.
- Patil S, Rao RS, Majumdar B, Anil S. Clinical appearance of oral *Candida* infection and therapeutic strategies. *Front Microbiol* 2015;6:1391.
- Bianchi CM, Bianchi HA, Tadano T, Paula CR, Hoffmann-Santos HD, Leite DP Jr., *et al.* Factors related to oral candidiasis in elderly users and non-users of removable dental prostheses. *Rev Inst Med Trop Sao Paulo* 2016;58:17.
- Lalla RV, Latortue MC, Hong CH, Ariyawardana A, D'Amato-Palumbo S, Fischer DJ, *et al.* A systematic review of oral fungal infections in patients receiving cancer therapy. *Support Care Cancer* 2010;18:985-92.
- Jeddy N, Ranganathan K, Devi U, Joshua E. A study of antifungal drug sensitivity of candida isolated from human immunodeficiency virus infected patients in Chennai, South India. *J Oral Maxillofac Pathol* 2011;15:182-6.
- Jayachandran AL, Katragadda R, Thyagarajan R, Vajravelu L, Manikesi S, Kaliappan S, *et al.* Oral candidiasis among cancer patients attending a tertiary care hospital in Chennai, South India: An evaluation of clinicomycological association and antifungal susceptibility pattern. *Can J Infect Dis Med Microbiol* 2016;2016:8758461.
- Zomorodian K, Kavooosi F, Pishdad GR, Mehriar P, Ebrahimi H, Bandegani A, *et al.* Prevalence of oral *Candida* colonization in patients with diabetes mellitus. *J Mycol Med* 2016;26:103-10.
- Dekhuijzen PNR, Batsiou M, Bjermer L, Bosnic-Anticevich S, Chrystyn H, Papi A, *et al.* Incidence of oral thrush in patients with COPD prescribed inhaled corticosteroids: Effect of drug, dose, and device. *Respir Med* 2016;120:54-63.
- Neville BW, Damm DD, Allen CM, Bouquot JE. Fungal and protozoal diseases. In: *Oral and Maxillofacial Pathology*. 2<sup>nd</sup> ed. Philadelphia: W.B. Saunders Company; 2002. p. 189-97.
- Garcia-Cuesta C, Sarrion-Pérez MG, Bagán JV. Current treatment of oral candidiasis: A literature review. *J Clin Exp Dent* 2014;6:e576-82.
- Axéll T, Samaranyake LP, Reichart PA, Olsen I. A proposal for reclassification of oral candidosis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1997;84:111-2.
- Doi AM, Pignatari AC, Edmond MB, Marra AR, Camargo LF, Siqueira RA, *et al.* Epidemiology and microbiologic characterization of nosocomial candidemia from a Brazilian national surveillance program. *PLoS One* 2016;11:e0146909.