

Distribution of demographic characteristics and predisposing disease in oral candidiasis patients at Prof. Ngoerah Hospital Denpasar in 2022-2023

I Gusti Agung Dyah Ambarawati^{1,*}, I Gusti Ayu Kade Ira Purbasari¹, Riki Kristanto¹, Ida Bagus Pramana Putra Manuaba¹ and I Gusti Agung Pramesti Dewi²

¹ Department of Oral Medicine, Faculty of Medicine, Udayana University, Denpasar, Bali, Indonesia.

² Dentistry Program, Faculty of Medicine Udayana University, Denpasar, Bali, Indonesia.

World Journal of Advanced Research and Reviews, 2024, 21(03), 2349–2355

Publication history: Received on 18 February 2024; revised on 27 March 2024; accepted on 29 March 2024

Article DOI: <https://doi.org/10.30574/wjarr.2024.21.3.0674>

Abstract

Oral candidiasis is an infection that occurs in the oral cavity due to invasion of *Candida* sp. in the superficial mucosal tissue. Oral candidiasis tends to occur in individuals with underlying predisposing diseases. This study aimed to investigate the distribution of demographic characteristics and underlying disease in oral candidiasis patients at Prof. Ngoerah Hospital, Denpasar, Bali, Indonesia. This research is a descriptive study with a cross-sectional design. The sample consisted of 53 participants with oral candidiasis that were selected through total sampling. Data for this study were collected retrospectively from medical records. Univariate analysis was performed to determine the prevalence of each variable. The average age of the samples was 41.15 ± 12.89 years with a male-to-female ratio of 1.65:1; were from Denpasar (45.3%); the educational status of most patients was high school (71.7%); and most samples were self-employed (64.2%). Based on the distribution of predisposing diseases, most patients had HIV (52.8%) and only one predisposing disease (75.5%). Among patients with HIV, the majority were at HIV stage IV (35.8%). Most patients in this study had a normal nutritional status (47.2%). This study showed that oral candidiasis is often found in individuals with predisposing diseases, such as HIV, especially in stage IV. We also found oral candidiasis in the patients with no predisposing factor identified. The presence of oral candidiasis in healthy patients with no predisposing factor identified needs direct vigilance on other factors.

Keywords: Oral Candidiasis; HIV; Demographic Characteristics; Predisposing Disease

1. Introduction

The human oral cavity is an area that is normally colonized by bacteria, fungi, viruses, and even protozoa. Disruptions that occur in the harmonious relationship between the host and the oral microflora can cause disease [1]. *Candida albicans* is the fungal species most frequently found in the oral cavity and is the main cause of oral candidiasis [1–3]. Oral candidiasis is an infection that occurs in the oral cavity due to the invasion of *Candida* sp. in superficial mucosal tissue [3]. *Candida* sp. is not pathogenic in healthy individuals, but under certain circumstances, this fungus can cause clinical disease [4–6]

Candida infections tend to occur in individuals with underlying predisposing conditions that affect host immunity [7]. The risk of *Candida* infections in the oral cavity has been widely studied and is reported to be associated with the use of broad-spectrum antibiotics, HIV infection, organ transplantation, and malignancies [6]. The prevalence of oral candidiasis infection was found to vary based on population characteristics with high rates in patients with malignancy and individuals with HIV [6,8,9].

* Corresponding author: I Gusti Agung Dyah Ambarawati

Since the 1980s, research on oral cavity infections has been widely carried out due to the increasing incidence of HIV/AIDS which can directly trigger an increase in the prevalence of opportunistic infections related to immune disorders [10]. The significant increase in *Candida* infections is also influenced by the increase of immunocompromised individuals due to various available medical treatments such as anticancer therapy, organ transplantation, broad-spectrum antibiotic therapy, and increased life expectancy for individuals with certain medical conditions (malignancy, HIV, and DM) [11]. The estimated prevalence of oral candidiasis indicates that there are at least 2 million cases worldwide, so oral candidiasis is one of the highest cases of fungal infections along with fungal infections of the skin, hair, and nails [10].

Various studies have extensively researched the relationship between oral candidiasis and certain diseases such as HIV and diabetes mellitus [12,13]. However, research regarding the distribution of demographic characteristics and predisposing disease of oral candidiasis has not been carried out much. This study aimed to investigate the distribution of demographic characteristics and underlying disease in oral candidiasis patients at Prof. Ngoerah Hospital, Denpasar, Bali, Indonesia.

2. Method

The type of this study was descriptive research with a cross-sectional design using secondary data from patient's medical records to see the distribution of demographic characteristics and predisposing disease in oral candidiasis patients at Prof. Ngoerah Hospital Denpasar according to age, sex, district origin, educational status, occupation, predisposing disease, HIV status, and nutritional status. A total sample of 53 medical records from oral candidiasis patients who came during the retrieval period from 1st January 2022 to 5th April 2023 were collected. Univariate analysis was carried out to describe each variable.

3. Result

Based on Table 1, the average age of the subject in this study is 41.15 ± 12.89 years. Most of the subjects in this study were male (62.3%) with a male-to-female ratio is 1.65:1. The majority of the subjects are from Denpasar (45.3%). In educational status and occupation variables of most subjects are high school (71.7%) and self-employed (64.2%).

Table 1 Demographic characteristics of oral candidiasis patients at Prof. Ngoerah Hospital in 2022-2023

| Variable | Frequency (n) | Percentage (%) |
|------------------------|---------------|----------------|
| Age (Mean) | 41.15 ± 12.89 | |
| Age Category | | |
| 10-20 years | 2 | 3.8 |
| 21-30 years | 9 | 17.0 |
| 31-40 years | 16 | 30.2 |
| 41-50 years | 16 | 30.2 |
| 51-60 years | 6 | 11.3 |
| >60 years | 4 | 7.5 |
| Sex | | |
| Male | 33 | 62.3 |
| Female | 20 | 37.7 |
| District Origin | | |
| Badung | 7 | 13.2 |
| Bangli | 3 | 5.7 |
| Buleleng | 8 | 15.1 |
| Denpasar | 24 | 45.3 |

| | | |
|-------------------------------------|----|------|
| Gianyar | 2 | 3.8 |
| Jembrana | 3 | 5.7 |
| Karangasem | 3 | 5.7 |
| Klungkung | 1 | 1.9 |
| Tabanan | 2 | 3.8 |
| Educational Status | | |
| No formal schooling | 2 | 3.8 |
| Elementary School | 6 | 11.3 |
| Junior High School | 1 | 1.9 |
| Senior High School | 38 | 71.7 |
| Bachelor's degree | 6 | 11.3 |
| Occupation | | |
| Housewife | 4 | 7.5 |
| Self-employed | 34 | 64.2 |
| Student | 5 | 9.4 |
| Civil servants and private employee | 4 | 7.5 |
| Farmer | 1 | 1.9 |
| Unemployed | 4 | 7.5 |

As outlined in Table 2, the most common oral candidiasis-predisposing disease found in this study was HIV (52.8%). Other predisposing diseases found in oral candidiasis patients were systemic lupus erythematosus (11.3%), pulmonary TB (7.5%), type 2 DM (5.7%), malignancy (5.7%), hypertension (3.8%), and GERD (1.9%).

Table 2 Distribution of predisposing diseases in oral candidiasis patients at Prof. Ngoerah Hospital in 2022-2023

| Variable | YES | | NO | |
|------------------------------|---------------|----------------|---------------|----------------|
| | Frequency (n) | Percentage (%) | Frequency (n) | Percentage (%) |
| HIV | 28 | 52.8 | 25 | 47.2 |
| Systemic Lupus Erythematosus | 6 | 11.3 | 47 | 88.7 |
| TBC | 4 | 7.5 | 49 | 92.5 |
| Type 2 DM | 3 | 5.7 | 50 | 94.3 |
| Malignancy | 3 | 5.7 | 50 | 94.3 |
| Hypertension | 2 | 3.8 | 51 | 96.2 |
| GERD | 1 | 1.9 | 52 | 98.1 |
| Epilepsy | 1 | 1.9 | 52 | 98.1 |

As demonstrated in Table 3, many patients had more than one predisposing disease identified, though the majority of oral candidiasis outpatients were found to have one predisposing disease (75.5%).

Table 3 Distribution of the number of predisposing diseases in oral candidiasis patients at Prof. Ngoerah Hospital in 2022-2023

| Variable | Frequency (n) | Percentage (%) |
|---|---------------|----------------|
| Predisposing Disease | | |
| None | 10 | 18.9 |
| HIV | 25 | 47.2 |
| HIV. TBC | 3 | 5.7 |
| Type 2 DM | 2 | 3.8 |
| Type 2 DM and epilepsy | 1 | 1.9 |
| Systemic Lupus Erythematosus | 5 | 9.4 |
| Malignancy | 3 | 5.7 |
| Hypertension | 1 | 1.9 |
| Hypertension. Systemic Lupus Erythematosus. TBC | 1 | 1.9 |
| GERD | 2 | 3.8 |
| Number of Predisposing Disease | | |
| None | 10 | 18.9 |
| Have 1 predisposing disease | 38 | 75.5 |
| Have 2 predisposing disease | 4 | 3.8 |
| Have 3 predisposing disease | 1 | 1.9 |

In patients with HIV, based on the HIV stage status, the majority were at HIV stage IV (35.8%). Smaller percentages were found in other HIV stages, HIV stage I (7.5%), HIV stage II (3.8%), and HIV stage III (5.7%).

Table 4 HIV Status in oral candidiasis patients at Prof. Ngoerah Hospital in 2022-2023

| Variable | Frequency (n) | Percentage (%) |
|---------------|---------------|----------------|
| HIV Stage I | 4 | 7.5 |
| HIV Stage II | 2 | 3.8 |
| HIV Stage III | 3 | 5.7 |
| HIV Stage IV | 19 | 35.8 |
| Non-HIV | 25 | 47.2 |

The nutritional status of patients with oral candidiasis based on BMI values in this study was mostly in the normal category (47.2%), though a large number did fall in the underweight category (45.3%).

Table 5 Nutritional Status in oral candidiasis patients at Prof. Ngoerah Hospital in 2022-2023

| Variable | Frequency (n) | Percentage (%) |
|--------------------|---------------|----------------|
| Nutritional Status | | |
| Normal | 25 | 47.2 |
| Underweight | 24 | 45.3 |
| Overweight | 1 | 1.9 |
| Obesities I | 3 | 5.7 |

4. Discussion

Based on demographic description, oral candidiasis in this study occurred in patients aged 18-78 years (mean 41.15 ± 12.89). Oral candidiasis in this study was more common in men (62.3%) than women (37.7%). These results are supported by research by Walangare et al. (2014) who found that oral candidiasis most often occurred in the 35-44 year age group (42.5%) and occurred more often in men (66.7%) [13]. Epidemiological cohort study found HIV infection is higher in men, for each 100 new HIV diagnoses, 83 are men and 17 are women [1]. This might explain the higher percentage of oral candidiasis in men [14]. Oral candidiasis rarely occurs in young people and more often in the adult to elderly age group, some literature explains that this is related to predisposing diseases or related systemic diseases which are more common in this age group [15].

The most common predisposing disease found in oral candidiasis patients in this study was HIV (52.8%). Similar results were also found in a previous study that examined the incidence of oral candidiasis in 170 patients with HIV, 64.11% were diagnosed with oral candidiasis [16]. Patients with HIV have a significantly higher risk of oral candidiasis infection [17]. Individuals with HIV have significantly lower levels of the protective antimicrobial peptide, namely hystatin-5, which can increase the risk of oral candidiasis [3]. Oral candidiasis is directly related to the immune status of HIV patients which can be estimated through CD4+ levels and HIV RNA levels [18].

The majority of patients with HIV and oral candidiasis were diagnosed with HIV stage IV (35.8%). WHO clinical staging of HIV puts the presence of oral candidiasis at stage III (persistent oral thrush) or stage IV (oesophageal candidiasis) and other study found that the majority of the disease was found in patients with stage III (66,7%) and stage IV (33,3%) [13]. Several studies examining the relationship between the incidence of oral candidiasis and HIV explain that patients with stage IV HIV are four times more at risk of oral candidiasis [19,20]. The occurrence of oral candidiasis in HIV patients is a clinical indicator of immune status and can help doctors monitor the progression of HIV infection to AIDS [17]. Our study found systemic lupus erythematosus (SLE) to be another predisposing disease, found in 11.3% of oral candidiasis patients. Individuals with SLE experience immune system abnormalities and usually receive treatment with immunosuppressant therapy, often including systemic steroids [21,22]. Long-term consumption of corticosteroid immunosuppressants can increase the risk of opportunistic infections, one of which is oral candidiasis [21]. Another predisposing disease that was also found in this study was malignancy, found in 5.7% of the patients with oral candidiasis. Oral candidiasis that occurs in patients with malignancy and those who have undergone chemotherapy is thought to be related to long-term neutropenia, use of broad-spectrum antibiotics, treatment with corticosteroids and cytostatic substances, and/or xerostomia due to radiation [23]. Patients with malignancies have a high risk of developing oral candidiasis, this is associated with the treatment received which is immunosuppressive, immunomodulatory, and long-term antibiotic consumption [17].

The percentage of patients with oral candidiasis who have a predisposing disease for type II DM was 5.7% in our study. The occurrence of oral candidiasis in patients with diabetes is associated with poor glycemic control, high glucose content in saliva, xerostomia, and changes in saliva pH. Based on previous research, patients with diabetes had 3.16 times more *Candida* species as microflora in their oral cavity [24]. Increasing the amount of *Candida* in the oral cavity causes an increased risk of opportunistic oral candidiasis infections [25,26].

Based on the number of predisposing diseases, most oral candidiasis patients were found to have one predisposing disease (75.5%) followed by no predisposing disease (18.9%). Previous research conducted by Chu (2017) found that 91.7% of oral candidiasis patients had a systemic disease that was a predisposing factor and only 8.3% had no predisposing disease at all [27]. Individuals with systemic diseases or related medical conditions are at greater risk of developing oral candidiasis [15,27].

Based on nutritional status known through BMI, our study found that 47.2% of subjects had normal nutrition, followed by 45.3% of subjects classified as underweight. Research related to nutritional status based on BMI in candidiasis patients was also carried out by Erfaninejad et al. (2022) who found that oral candidiasis occurred in individuals with an average BMI of 23.93 ± 5.35 [19]. The incidence of oral candidiasis is related to malnutrition, malabsorption, and eating disorders as the predisposing factors [3]. The relatively large percentage found in the malnutrition category in this study is possibly related to the large number of research subjects who have HIV as a predisposing disease [28,29].

5. Conclusion

The result from this study showed that oral candidiasis is often found in individuals with predisposing diseases, such as HIV, especially in stage IV. We also found oral candidiasis in the patients with no predisposing factor identified. The presence of oral candidiasis in healthy patients with no predisposing factor identified needs direct vigilance on other factors, so it's important to be able to diagnose any predisposing diseases earlier by HIV testing, glucose testing, review of medical history, and medications.

Compliance with ethical standards

Acknowledgments

Thanks to the Director of Prof. Dr. I. G.N.G Ngoerah Hospital Denpasar who has provided opportunities and facilities in carrying out our research. We also like to thank the Medical Records Department at Prof. Dr. I. G.N.G Ngoerah Hospital Denpasar for helping us in this research.

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

Statement of ethical approval

This research was ethically approved by the ethics committee of Prof. Dr. I. G.N.G Ngoerah Hospital Denpasar 3117/UN14.2.2.VII.14/LT/2023

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

- [1] Patel M. Oral Cavity and Candida albicans: Colonisation to the Development of Infection. *Pathogens* 2022;11. <https://doi.org/10.3390/pathogens11030335>.
- [2] Sharma A. Oral candidiasis: An opportunistic infection: A review 2018.
- [3] Vila T, Sultan AS, Montelongo-Jauregui D, Jabra-Rizk MA. Oral candidiasis: A disease of opportunity. *Journal of Fungi* 2020;6. <https://doi.org/10.3390/jof6010015>.
- [4] Bhatt L, Raj Bhatt L, Raj Awasthi T. Prevalence of Oral Candidiasis by Candida albicans in Patients with Type 2 Diabetes Mellitus Visiting Mahakali Zonal Hospital 2020.
- [5] Millsop JW, Fazel N. Oral candidiasis. *Clin Dermatol* 2016;34:487–94. <https://doi.org/10.1016/j.clindermatol.2016.02.022>.
- [6] Shukri NMM, Chaudhary M, Balasubramaniam A. Prevalence of candidiasis in chennai population. *Int J Dent Oral Sci* 2019;2:1–5. <https://doi.org/10.19070/2377-8075-SI02-04001>.
- [7] Scully C. *Oral and Maxillofacial Medicine: The Basis of Diagnosis and Treatment*. 2012.
- [8] Silva MFA, Barbosa KGN, Pereira JV, Bento PM, Godoy GP, Gomes DQ de C. Prevalence of oral mucosal lesions among patients with diabetes mellitus types 1 and 2. *An Bras Dermatol* 2015;90:49–53. <https://doi.org/10.1590/abd1806-4841.20153089>.
- [9] Lyu X, Zhao C, Yan ZM, Hua H. Efficacy of nystatin for the treatment of oral candidiasis: A systematic review and meta-analysis. *Drug Des Devel Ther* 2016;10:1161–71. <https://doi.org/10.2147/DDDT.S100795>.

- [10] Černáková L, Líšková A, Lengyelová L, Rodrigues CF. Prevalence and Antifungal Susceptibility Profile of Oral *Candida* spp. Isolates from a Hospital in Slovakia. *Medicina (Lithuania)* 2022;58. <https://doi.org/10.3390/medicina58050576>.
- [11] Surain P, Aggarwal N. Epidemiology of Oral and Vaginal Candidiasis. *International Journal of Science and Research* 2018. <https://doi.org/10.21275/MOB1636>.
- [12] Nur'aeny N, Hidayat W, Dewi TS, Herawati E, Wahyuni IS. Profil oral candidiasis di bagian ilmu penyakit mulut RSHS Bandung periode 2010-2014. *Majalah Kedokteran Gigi Indonesia* 2017;3:23. <https://doi.org/10.22146/majkedgiind.11320>.
- [13] Walangare T, Hidayat T, Basuki S. Profil Spesies *Candida* pada Pasien Kandidiasis Oral dengan Infeksi HIV&AIDS (The Profile of *Candida* Species in Oral Candidiasis Patient with HIV&AIDS Infection). 2014.
- [14] Hu L, He C, Zhao C, Chen X, Hua H, Yan Z. Characterization of oral candidiasis and the *Candida* species profile in patients with oral mucosal diseases. *Microb Pathog* 2019;134. <https://doi.org/10.1016/j.micpath.2019.103575>.
- [15] Meira H, De Oliveira B, Pereira I, Naves M, Mesquita R, Santos V. Oral candidiasis: A retrospective study of 276 Brazilian patients. *Journal of Oral and Maxillofacial Pathology* 2017;21:351–5. https://doi.org/10.4103/jomfp.JOMFP_77_16.
- [16] Satvikalakshmi. Prevalence of oral candidiasis in HIV patients in the era of HAART through salivary candidal carriage. 2019.
- [17] Marie A, Pedersen L. *Oral Infections and General Health From Molecule to Chairside*. 2015.
- [18] Murtiastutik D, Rosita Sigit Prakoswa C, Setyawati Tantular I, Ervianti E, Nurul Hidayati A, Yulianto Listiawan M. Correlation between CD4 T lymphocyte and *Candida* Species Counts In Oral Candidiasis Patients with HIV / AIDS. *Indian Journal of Forensic Medicine & Toxicology* 2021;15:1013.
- [19] Erfaninejad M, Zarei Mahmoudabadi A, Maraghi E, Hashemzadeh M, Fatahinia M. Epidemiology, prevalence, and associated factors of oral candidiasis in HIV patients from southwest Iran in post-highly active antiretroviral therapy era. *Front Microbiol* 2022;13. <https://doi.org/10.3389/fmicb.2022.983348>.
- [20] Suryana K, Suharsono H, Antara IG PJ. Factors associated with oral candidiasis in people living with HIV/AIDS: A case control study. *HIV/AIDS - Research and Palliative Care* 2020;12:33–9. <https://doi.org/10.2147/HIV.S236304>.
- [21] Amalia T, Setiadhi R. Laporan kasus Terapi kandidiasis pada anak dengan lupus eritematosus sistemik disertai ko-infeksi tuberkulosis 2019. <https://doi.org/10.24198/jkg.v31i3.23361>.
- [22] Fangtham M, Magder LS, Petri MA. Oral candidiasis in systemic lupus erythematosus. *Lupus* 2014;23:684–90. <https://doi.org/10.1177/0961203314525247>.
- [23] Mäkinen AI, Mäkitie A, Meurman JH. *Candida* prevalence in saliva before and after oral cancer treatment. *Surgeon* 2021;19:e446–51. <https://doi.org/10.1016/j.surge.2021.01.006>.
- [24] Rodríguez-Archilla A, Piedra-Rosales C. *Candida* species oral detection and infection in patients with diabetes mellitus: a meta-analysis. *Iberoamerican Journal Of Medicine* 2021;02:115–21. <https://doi.org/10.5281/zenodo.4495286>.
- [25] Cervino G, Terranova A, Briguglio F, De Stefano R, Famà F, D'Amico C, et al. Diabetes: Oral health related quality of life and oral alterations. *Biomed Res Int* 2019;2019. <https://doi.org/10.1155/2019/5907195>.
- [26] Shah Imamzai I, Ahmadzai H, Khan Kamawal N, Habib F. Prevalence of Oral Candidiasis in Diabetic Patients at Nangarhar University Teaching Hospital. *International Journal of Academic Research in Progressive Education and Development* 2022;11:455–63. <https://doi.org/10.6007/IJARPED/v11-i1/12186>.
- [27] Chu X. Oral candidiasis: relation to systemic diseases and medications. *Dent* 3000 2017;5. <https://doi.org/10.5195/d3000.2017.74>.
- [28] Little J, Miller C, Rhodus N. *Dental management of the medically compromised patient*. 2018.
- [29] Singh U, Singh A. *Clinical Stages of HIV*. 2011.