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Original article

PREVALENCE OF ORAL CANDIDIASIS AMONG CANCER PATIENTS ATTENDING A TERTIARY CARE HOSPITAL IN RANCHI, EAST INDIA: A RETROSPECTIVE STUDY.

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Abstract

Background:

Candida species have become important human infections over the past 20 years, and they are currently the fourth most common source of nosocomial infection. One of the frequent side effects of cancer patients receiving cytotoxic therapy is oropharyngeal candidiasis, which can invade deeper tissues if left untreated. A critical issue and serious concern is the emergence of antifungal drug resistance because leading to increased morbidity and mortality. The present study aims to determine the occurrence of oral Candidiasis among cancer patients at Rajendra Institute of Medical Sciences, Ranchi.

Materials and Methods:

A total of 282 cancer patients who had symptoms or signs of oral candidiasis and were receiving chemotherapy or radiation therapy were recruited. Speciation and antifungal susceptibility testing were performed for Candida spp.

Results:

Candida albicans alone outnumbered other species and accounted for 47.68% episodes of oral thrush. There was a significant association between the presence of dry mouth and isolation of Candida spp. Patients with oral cancer comprised the major percentage of cases followed by gastrointestinal tract (GIT) malignancy. The mean hospital stay was 3.58 days (range; 1-9 days). All Candida isolates showed 100% sensitivity to voriconazole and micafungin.

Conclusion:

In conclusions, the finding of our study strongly suggest that oral candidiasis is a frequent complication among cancer patients, being Candida albicans the main etiological agent.

Keywords: Cancer, Oral candidiasis, Candida albicans, Antifungal agents, chemotherapy,
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1. Introduction

The widespread Candida spp. is a common cause of oropharyngeal candidiasis and nosocomial infections, including life-threatening infections in cancer patients.[1] Candida spp. actually colonises a large number of people as a commensal organism. Therefore, the clinical presence of yeast in cancer patients must be closely evaluated.[2] Oropharyngeal candidiasis is a typical fungal illness in persons with compromised immune systems. The immune system's capacity to defend against fungal infections is impacted by cancer, chemotherapy, and radiation treatment.[3] Candida species are commonly present in the oral

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cavity as commensals and the emergence of these species as opportunistic infectious pathogens may be associated to certain virulence factors.[4] Patients with advanced cancer have been shown to have a greater incidence of oral colonisation with non-albicans Candida.[5] Despite having a close relationship, *Candida albicans* and non-albicans Candida have different antifungal susceptibility patterns. If not properly treated, the colonised Candida can penetrate the underlying mucosa and reach the blood stream, causing widespread disease with significant morbidity and mortality. One of the first-line medications for treating oral candidiasis in cancer patients is fluconazole. [6,7] Invasive Candida infections are typically treated with amphotericin B. Echinocandins, a more recent medication, is only used to treat refractory candidiasis. The presence of Candida in the oral cavity should be thoroughly assessed clinically and microbiologically in cancer patients. [6,7] The current study seeks to identify the species of Candida that have been isolated from the oral cavities of patients who have cancer, as well as to examine the isolates' antifungal susceptibility patterns and assess the relationship between clinical and mycological data.

2. Materials and Methods

This observational study was conducted in the Department of Microbiology, RIMS, Ranchi from January 2021 to December 2022. The study was approved by the institutional ethical committee. A total of 210 cancer patients on chemotherapy and/or radiotherapy attending either outpatient or inpatient oncology department with signs and symptoms suggestive of oral candidiasis like presence of white plaque, pseudomembranes, erythematous lesion, ulcerative lesion, dryness of mouth, pain, altered taste sensation, and halitosis were included in the study. Unwillingness to participate, very critical patients and those on antifungal therapy for past two weeks were excluded from the study. Two sterile swabs were used to collect sample from the oral cavity by swabbing over the lesions. One swab was used for direct gram staining to look for the presence of gram positive yeast cell and pseudohyphae. The other swab was used for inoculating the specimen into Sabouraud dextrose agar (SDA). The growth of creamy white colonies was subjected to gram staining for presence of gram positive budding yeast cells.[8] Colonisation is defined as the presence of yeast cells in the oral cavity with/without clinical signs and symptoms. Germ tube test was performed for all the isolates and further speciation was done by colony morphology in chrom agar (colour of the colony), growth in corn meal agar (dalmau plate culture), and sugar assimilation as per standard microbiological techniques [9]. The clinical and laboratory data were collected in a structured proforma. The anti-fungal susceptibility tests of the isolates were performed by an automated method (VITEK 2 system) with anti-fungal drugs amphotericin B (AMB), caspofungin (CAS), fluconazole (FLU), flucytosine (FC), micafungin (MFG), and voriconazole (VRC) using AST-YS08 card. Data were collected in a structured proforma and were classified, analyzed, and evaluated by using SPSS version 21 for Windows (SPSS Inc., Chicago, IL) for statistical analysis.

3. Results

A total of 173 cancer patients showed oral candidiasis during two years of study period comprising 59.3% male patients and 40.7% females (Table -1) Patients with oral cancer (32.3%) comprised the major percentage of cases followed by gastrointestinal tract (GIT) malignancy (21.4%) (Table-1). The most commonly encountered symptom in the present study was presence of white patch (68%) followed by pain in oral cavity (49%) as shown in (Figure-1). The most common sign observed was presence of white plaques/patches and presence of dry mouth and maximum Candida species were isolated from these cases respectively (Table-2). Candida species were isolated in SDA media and gram stain was performed which depicted Budding yeast cells with pseudohyphae formation as shown in Figure-2. Isolated colonies from Chrom Agar plate and further confirmed in automated system (VITEK-2) differentiated between albicans (

n=93) and non-albicans groups (n=80). In 53.8% cases Candida albicans were isolated as compared to non- albicans Candida group comprising 32.9% Candida tropicalis, 6.9%, Candida krusei, 4.1%Candida parapsilosis, 2.3% Candida guilliermondi as depicted in (Figure-3). All the Candida isolates showed 100% sensitivity to voriconazole and micafungin and sensitivity to other drugs as fluconazole, amphotericin B, caspofungin and flucytosine as shown in figure -4

4. Discussion

Oral candidiasis is a significant global issue, particularly for cancer patients receiving cytotoxic medication. Ramirez-Amador et al. reported that 38% of cancer patients receiving radiation had oropharyngeal candidiasis [10]. Oral candidiasis incidence ranged from 7 to 52% in cancer patients receiving chemotherapy and/or radiation therapy, according to research [3]. Patients typically progress from the stage of asymptomatic colonisation to infection. The immune system is impacted by cancer, chemotherapy, and radiotherapy, which increases the likelihood of oropharyngeal candidiasis in the patient. The use of antibacterials and steroids, concomitant illnesses including diabetes, poor dental hygiene, and cigarette use are among the several additional risk factors [11]. Worldwide, candida infections are a serious problem, especially for cancer patients [10,11]. The prevalence of Candida albicans and other yeasts in the oral cavities of cancer patients varies greatly. The most prevalent cancers in the study group were oral cancer (32.3%), gastrointestinal cancer (21.4%) and breast cancer (11.6%), respectively according to earlier studies [12].

5. Conclusion

Oral candidiasis is a typical fungal infection in cancer patients taking chemotherapy and/or radiation therapy. The correlation between clinical and microbiological data can occasionally help to link certain symptoms with the isolation of Candida species in cancer patients, although such correlations are not always causal. Clinically, it may be beneficial when a patient complains of a specific symptom, such as dry mouth; there should be a strong suspicion that the symptom is connected to a Candida infection. Species level identification with the in vitro antifungal susceptibility pattern is essential for choosing the right antifungal drug and predicting the course of treatment. The findings of our study provide strong evidence in favour of the claim that oral candidiasis is a prevalent issue among cancer patients, with Candida albicans acting as the main etiological agent. Most of the examined Candida spp. isolates had high levels of azole and polene resistance. Cancer patients usually have Candida albicans in their oral cavity, which emphasises the significance of adequately treating the infection before starting any anticancer medication because failure to do so could have catastrophic repercussions.

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7. Conflict of interest:

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Table 1: **Demographic Characteristics of Cancer Patients with Candidiasis**

Patient characteristic	**No. (%)**
Sex	
Male	102 (59.3)
Female	71 (40.7)
Age (years)	
Range	15 – 79
Mean	49.88
Weight (Kg)	
Range	38-80
Mean	52.67
Days admitted in hospital (days)	
Range	1-9
Mean	3.58
Distribution of the patients based on the type of cancer	
Carcinoma oral cavity	56 (32.3)
Carcinoma Gastrointestinal tract	37 (21.4)
Carcinoma Breast	20 (11.6)
Carcinoma Lung	17 (9.8)
Chronic myeloid leukemia/ Lymphoma	16 (9.2)
Carcinoma Head and Neck	14 (8.1)
Others	13 (7.5)
Total	**173**

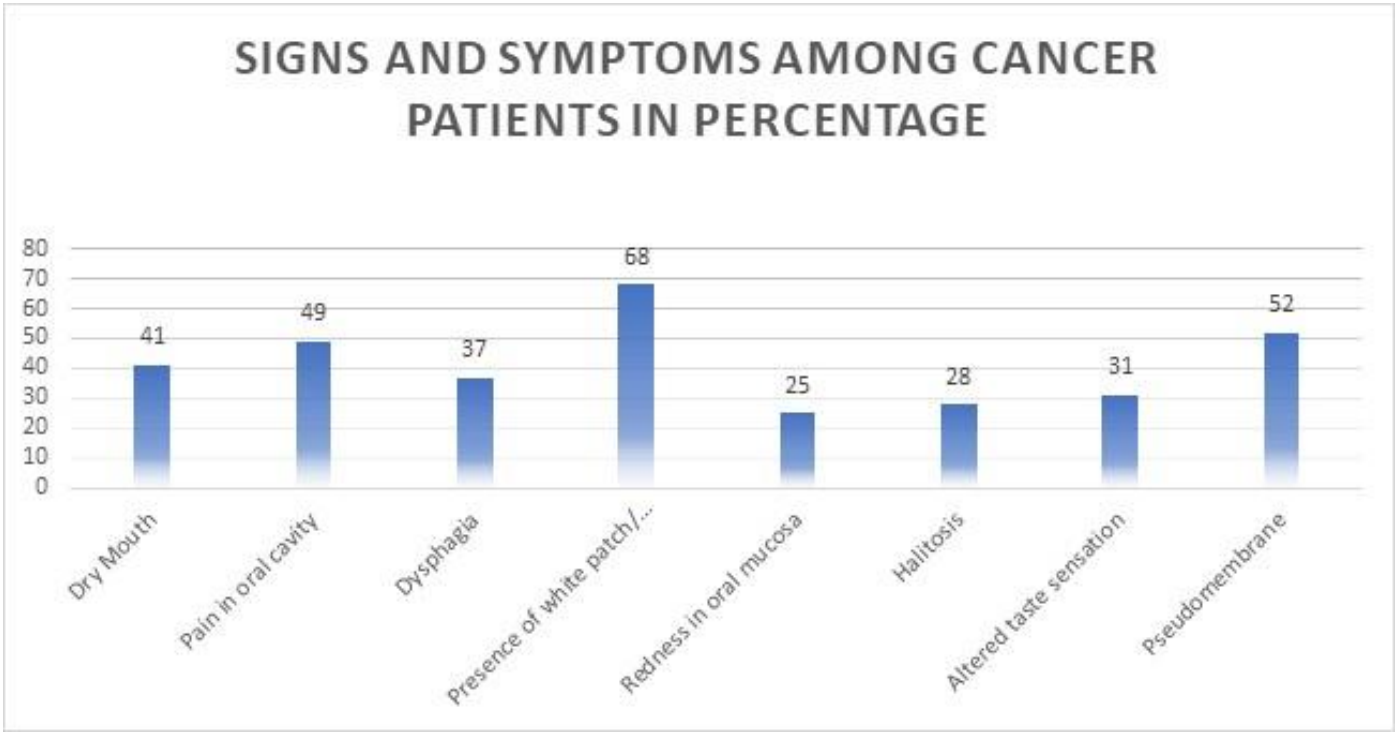

Figure 1: **Distribution of signs and symptoms among Cancer patients**

Table 2: **Mycological and clinical association between the symptoms/signs**

S. number	Symptom/signs	No isolation of candida	Isolation of candida	Total	value
1	Presence of dry mouth	33	38	71	<0.001
	Absence of dry mouth	100	2	102	
2	Presence of erythema	32	12	44	0.187
	Absence of erythema	110	16	129	
3	Presence ofwhite patch	17	101	118	0.25
	Absence of white patch	27	28	55	
4	Presence of ulcer	20	13	33	-
	Absence of ulcer	125	15	140	

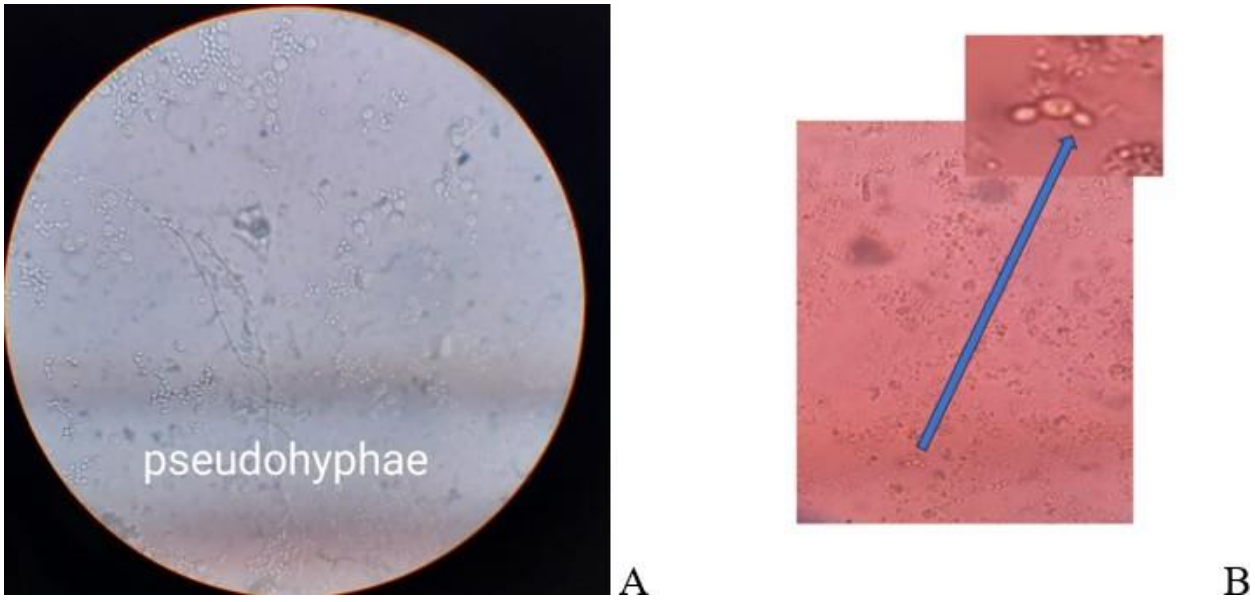

Figure 2: Figure-2 Direct gram staining showing pseudohyphae (A) and budding yeast cell (B)

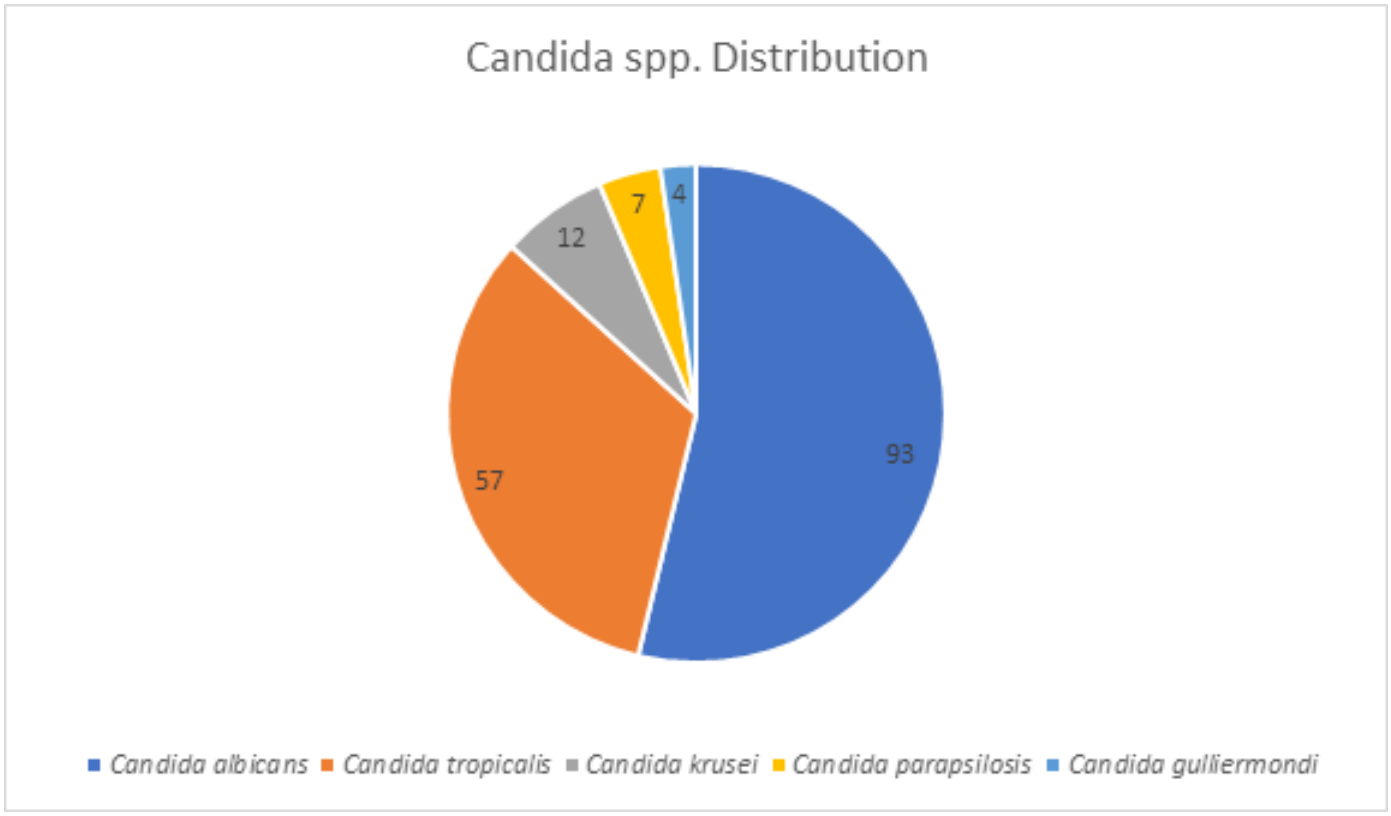

Figure 3: Figure-3 Species wise distribution of Candida isolates

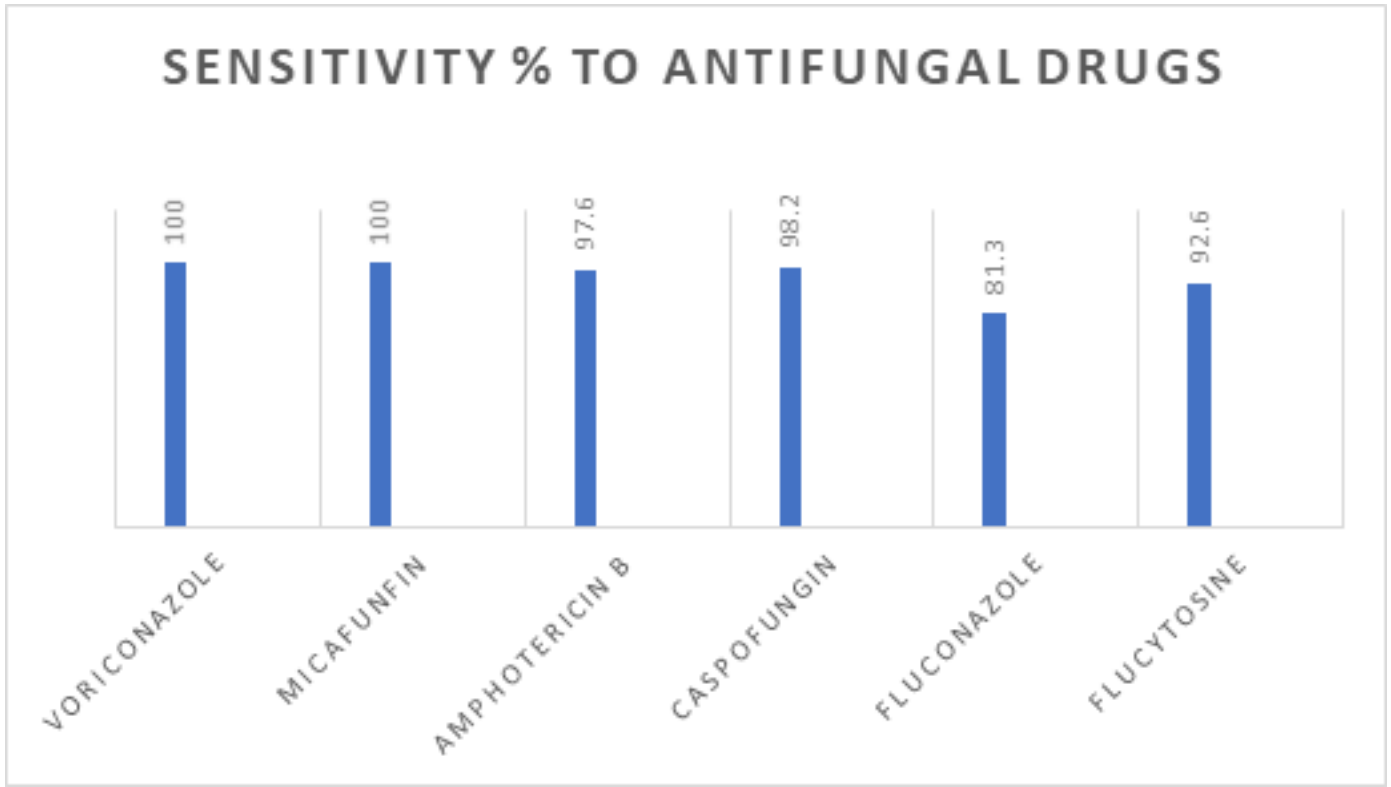

Figure 4: Antifungal sensitivity pattern ofCandida isolates in present study.

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