

Incidence of Candidiasis in Oral Cancer Patients Pre and Post Radoithery Treatment

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Abstract:

Background: Oral candidiasis is one of the common infection observed in cancer patients mainly on cytotoxic therapy and in gets invades into deeper tissues can occur if treatment is not adequate. Emergence of antifungal drug resistance is of serious concern leading to morbidity and mortality. The present study aims of finding incidence of candidiasis in oral cancer patients and their antifungal drug susceptibility.

Material and methods: A total of 60 patients have been selected for this study, those were diagnosed for oral cancer from January to June 2018. The samples were taken All isolates were identified and tested for antifungal susceptibility according to CLSI guidelines 2016.

Results: Out of 60 oral cancer patients, 30 samples were collected from patients before radio therapy and 30 samples were collected from patients after radio therapy. Out of 30 samples from pretreatment cases, 16 cases of *Candida* species were isolated and from post treatment cases, 21 cases of *Candida* species were obtained. Out of 16 *Candida* isolates from pretreatment cases, *C. albicans*(8), *C. dubliniensis*(2), *C. krusei*(4) and *C. parapsilosis*(2) were identified. Out of 21 *Candida* isolates from post treatment, *C. dubliniensis*(9), *C. albicans*(7), *C. krusei*(2) and *C. glabrata*(3) were further identified. Amphotericin B was most sensitive drug for all *Candida* species except *C. parapsilosis* and Fluconazole was mostly resistant among all *Candida* species.

Conclusion: *Candida albicans* was predominantly isolated from oral cancer patients and most effective antifungal drug was amphotericin B and least effective antifungal drug was found to be fluconazole. fungal culture and anti fungal susceptibility tests are necessary for effective treatment. After radiotherapy *Candida* infection was recorded more common than that of pre radio therapy, it shows radio therapy increases the risk of local *Candida* infection due to immune-suppression.

Keywords: oral candidiasis, candida, HiChrome agar

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I. Introduction

Oral candidiasis is a common fungal infection affecting immunocompromised patients. Conditions like malignant neoplasm, chemotherapy, and radiotherapy compromise the cell mediated immunity leads to fungal infections [1]. *Candida* species are normally present as commensals in the oral cavity and their transition to become an opportunistic infective agent may be associated with certain virulence determinants [2]. Incidence of oral candidiasis has been reported to be ranging from 7 to 52% among cancer patients (head and neck malignancy, hematopoietic malignancy, and solid tumors) on chemotherapy and or radiotherapy [1]. This indicates that the death rate because of cancer will also increase from 680000 to 1-2 million in the same period [3].

A higher incidence of oral colonisation with non-*Candida albicans* has been reported in patients with advanced stage of cancer [4]. Although *Candida albicans* and non-*Candida albicans* are closely related, they differ in the antifungal susceptibility patterns. Non-albicans candida causing opportunistic pathogens i.e. *C. tropicalis*, *C. krusei*, *C. glabrata*, *C. guilliermondii*, *C. parapsilosis*, *C. lusitanae*, *C. kefyr*, *C. rugosa*, *C. dubliniensis*, *C. viswanathi* [5].

The colonised *Candida* invades the underlying mucosa and enter into the blood stream leading to disseminated disease which leads to morbidity and mortality if not treated properly. Fluconazole is one of the first line drugs used for the treatment of oral candidiasis in cancer patients [4-5]. Amphotericin B is usually used for invasive *Candida* infections. Newer drugs like echinocandins are reserved for therapy of refractory candidiasis [5-6].

So, It is important that cancer patients should be evaluated clinically and microbiologically for the presence of *Candida* in the oral cavity. The present study aims for *Candida* isolation from oral cavity of cancer

patients, to study the antifungal susceptibility pattern of the isolates and to evaluate the association between clinical and mycological findings.

II. Material And Methods

A total of Sixty patients of oral malignancies, out of these 30 samples were taken before treatment and 30 samples were taken post treatment were taken and studied for identification of *Candida* species in Department of Microbiology, Ayaan Institute of Medical Sciences, Teaching Hospital & Research Centre, Hyderabad.

Sample collection and processing:

Oral swab from lesion site is a relatively simple method for isolating and semi-quantitative estimation of *Candida*. The sampling approach involves gently rubbing a sterile cotton swab over the lesion tissue and then subsequently inoculating on primary isolation medium such as Sabouraud's dextrose agar (SDA)

(i) **Wet preparation:** 10% KOH was mixed with the specimen on a glass slide & specimen material was teased with two inoculating needles. A cover slip was placed on it & examined 1st under low power than under high power of the microscope to ascertain the presence of yeast cells

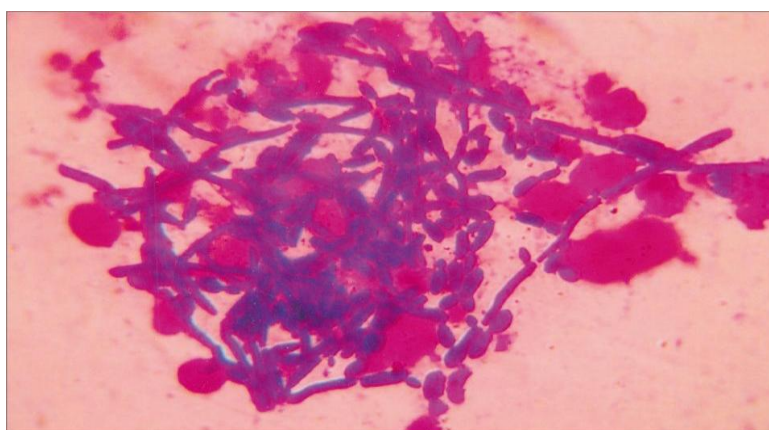


Figure 1: Gram stain of *Candida* species showing yeast cells and pseudohyphae

(ii) **Gram's staining:** Smear was prepared, fixed & stained by Gram staining method. It stains the *Candida* species as gram positive yeast cells.

Culture:

The organism was identified using conventional method that included Gram stain, colony morphology on Sabouraud dextrose agar (SDA) with and without chloramphenicol tubes, Germ tube test, CHROM agar (HI media) for species identification, Cornmeal agar with Tween-80 inoculation (HI media) for chlamyospore production. Antifungal susceptibility testing (AFST) was carried out by using disk-diffusion method.

III. Observations And Results

In the present study, 60 oral cancer patients were taken, 30 patient's samples were collected before initiation of radio therapy and 30 patients samples were collected after radio therapy. 14 out of 30 samples from pre-treatment cases *Candida* species was isolated and from post treatment cases, 19/30 *Candida* were isolated. Amphotericin B was most sensitive drug for all *Candida* species except *C. parapsilosis* and Fluconazole was found most resistant for all *Candida* species.

This study was carried out in the age group of 21- 90 years. Among 30 patients of pretreatment, there were 24 males & 6 females and in 30 cases of post treatment, there were 4 males & 26 females.

Out of 16 culture positive cases in pretreatment patients, the commonest isolates were *C. albicans*(8), *C. dubliniensis*(2), *C. krusei*(4) and *C. parapsilosis*(2) were identified. Out of 21 *Candida* isolates from post treatment patients, *C. dubliniensis*(9), *C. albicans*(7), *C. krusei*(2) and *C. glabrata*(3) were further isolated.

Table 1: Total Candida isolated from oral cancer patients (Pre and post treatment)

Candida species	Candida isolated from pre-treatment patients	Candida isolated from post-treatment patients
<i>Candida albicans</i>	8	7
<i>Candida dublinensis</i>	2	9
<i>Candida krusei</i>	4	2
<i>Candida parapsilosis</i>	2	-
<i>Candida glabrata</i>	-	3
Total	16	21

IV. Discussion

A significantly higher rate of total colonization and oral candidiasis was seen among patients receiving chemotherapy as compared to patients pre treatment alone in the present study. It is well known that radiotherapy leads to mucositis, xerostomia and mucosal damage, which promote yeast infection. Also, neutropenia due to prolonged chemotherapy, disruption of mucosal barrier and overall damage to cell mediated immunity increases the risk of infection. Similar trends have been seen in various studies conducted across the world. Amador et al. found that radiotherapy induced hypo salivation encourages oral candida colonization that often leads to oral/pharyngeal candidiasis similarly found an increased incidence of oropharyngeal candidiasis in patients receiving concomitant radiotherapy and chemotherapy.

The total numbers of 37 Candida species were isolated in the oral cavity. *Candida albicans* was found to be the predominant with 15/37. The majority of yeast isolates from oral cavity swabs were *C. albicans* (15 isolates) but it was often recovered in association with other yeasts. This was followed by *C. glabrata* (3), *C. krusei* (3), *C. dublinensis* (11) and, *C. parapsilosis* 2 isolates of distribution of species. CHROMagar candida is one of the most widely used media in the mycology laboratory.

V. Summary And Conclusion

Candida albicans was predominant isolates in oral cancer patients in pre-radiotherapy patients. The most effective antifungal drug observed was amphotericin B and least effective antifungal drug was found fluconazole. This study showed a lot of variation in drug sensitivity, this shows irrational use of antifungal drugs. Thus, fungal culture and anti fungal susceptibility tests are necessary for efficient treatment. After radiotherapy Candida infection was recorded more than that of pre-radiotherapy, it shows radio therapy increases the risk of local Candida infection due to immune-suppression. *C. albicans* is the most frequently isolated yeast from the oral cavity infection patients. CHROMagar Candida is a useful culture medium for the isolation and direct identification of *Candida* species.

References

- [1]. John E. Edwards Jr. *Candida Species In: Mendel GL, Bennett JE, Dolin R. Principles and Practice of Infectious Diseases. 7th edition. Elsevier: Churchill Livingstone 2010; p 3225-40*
- [2]. Jham BC, Franca EC, Oliveira RR, et al. *Candida oral colonization and infection in Brazilian patients undergoing head neck radiotherapy: a pilot study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007; 103:335-58*
- [3]. Rajesh Dikshit, Prakash C Gupta, Chinthan Ramasundarathettige, Vendhan Gajalakshmi, Lukasz Aleksandrowicz, Rajendra Badwe, Rajesh Kumar, Sandip Roy, Wilson Suraweera, Freddie Bray, Mohandas Mallath, Poonam K Singh, Dharendra N Sinha, Arun S Shet, Hellen Gelband, Prabhat Jha for the Million Death Study Collaborators, "Cancer mortality in India: a nationally representative survey".
- [4]. J. K. Elango, P. Gangadharan, S. Sumithra, and M. A. Kuriakose, "Trends of head and neck cancers in urban and rural India," *Asian Pac J Cancer Prev*, vol. 7
- [5]. Anil K. Chaturvedi, William F. Anderson, Joannie Lortet-Tieulent, Maria Paula Curado, Jacques Ferlay, Silvia Franceschi, Philip S. Rosenberg, Freddie Bray, and Maura L. Gillison, "Worldwide Trends in Incidence Rates for Oral Cavity and Oropharyngeal Cancers".
- [6]. PLopez Jomet, FJ Gomez Garcia, M Lucero Berdugo, F Parra Perez, A Pons-Fuster Lopez, "Mouth self-examination in a population at risk of oral cancer".
- [7]. Wen-JiunLin,1 Rong-SanJiang,1 Shang-HengWu,1 Fun-JouChen,2 andShih-AnLiu1,3, "Smoking,Alcohol, andBetel QuidandOralCancer: AProspective CohortStudy".
- [8]. Manisha Sharma1, Manas Madan2, Mridu Manjari3, Tejinder Singh Bhasin4, Spriha Jain5, Saamil Garg6, "Prevalence of Head and Neck Squamous Cell Carcinoma (HNSCC) in our population: The clinicopathological and morphological description of 198 cases".
- [9]. Freddie Bray, Jian-Song Ren, Eric Masuyer and Jacques Ferlay, "Global estimates of cancer prevalence for 27 sites in the adult population in 2008".
- [10]. Sree Vidya Krishna Rao1, Gloria Mejia1, Kaye Roberts-Thomson1, Richard Logan2, "Epidemiology of Oral Cancer in Asia in the Past Decade- An Update (2000-2012)".
- [11]. Shalini Gupta, Rajender Singh1, O. P. Gupta2, Anurag Tripathi, "Prevalence of oral cancer and pre cancerous lesions and the association with numerous risk factors in North India: A hospital based study".

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