Content available at: https://www.ipinnovative.com/open-access-journals

IP International Journal of Medical Microbiology and Tropical Diseases

Journal homepage: https://www.ijmmtd.org/

Original Resesarch Article

Speciation of candida species isolated from patients with esophageal candidiasis and their antifungal susceptibility test to fluconazole

Mohammad Zulfiqar Ali[1], Shweta R Sharma[1,*], Amit Mishra[2], Umar Farooq[1], Sudhir Singh[1], Vasundhara Sharma[1], Imran Ahamad[1]

[1]*Dept. of Microbiology, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India*
[2]*Dept. of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India*

ARTICLE INFO

Article history:
Received 03-08-2021
Accepted 18-08-2021
Available online 12-02-2022

Keywords:
Candida
Esophageal candidiasis
Antifungal susceptibility

ABSTRACT

Context: Esophageal candidiasis is often observed in patients for its development and fluconazole is the therapeutic choice for the treatment.
Aim & Objectives: To determine its frequency, by performing upper gastrointestinal endoscopy and the frequency of various *candida* species isolated from patients with EC. To determine the antifungal susceptibility to fluconazole of isolated various *candida* species.
Materials and Methods: From January 2020 to December 2020, total 73 patients found eligible for this study from endoscopy unit in Teerthanker Mahaveer medical hospital and research center (Moradabad), who presented whitish plaques consistent with esophageal candidiasis in order to identify *candida* species and verify their susceptibility to fluconazole.
Result: Total 4256 patients referred to UGI endoscopy at the endoscopy unit, 73(1.7%) had found esophageal candidiasis. Most affected age group from this disease was found 41-60 years (48%). Frequent number of *candida* species isolated was *Candida albicans* 50(68.5%). A total of 15(20.6%) isolated *candida* species were resistant to fluconazole, while 2(2.7%) had intermediate sensitivity to this drug.
Conclusion: Esophageal candidiasis prevalence was low although similar or within the results described by other authors. The common causative species was found *Candida albicans* for this disease and the resistant to fluconazole were considered high.

1. Introduction

Esophageal Candidiasis (EC) is an active common resourceful infection in humans with lower immunity, for example- Human immunodeficiency virus (HIV) infection, diabetes mellitus. Sometime we can also see esophageal candidiasis in healthy human beings without any immunosuppressive disease. There are certain predisposing factors responsible for esophageal candidiasis in a healthy individual. Esophageal diseases such as non-infectious esophagitis or achalasia are also the cause of development of esophageal candidiasis.[1] Candidiasis is frequently fungal disease found in individuals affecting mucosa, nails and other parts. It is spread by various species of *Candida* like *Candida albicans*. The disease may be severe or long-lasting, external or deep and their clinical manifestations are varied according to the site of involvement. It is very rarely found as disease and mainly seen as secondary infection in immunocompromised patients.[2] Uses of antibiotic drugs, corticosteroids and immunosuppresses for longer time are also including with the risk of candidiasis. In the year 1990 the addition of novel era of oral antifungal drug has been recognized as an important agent for treatment

* *Corresponding author*.
E-mail address: ghaffarzulfi08@gmail.com (S. R. Sharma).

https://doi.org/10.18231/j.ijmmtd.2022.010

of patients suffering from *candida* infection. Fluconazole is recommended as the effective drug for treatment of esophageal candidiasis.[3] Esophageal candidiasis is the infection developed by the colonization of *candida* species mainly in the lower third of esophagus, as a result of whitish plaques related to oral thrush.[1] that is especially visible in the extreme or in long lasting HIV contamination. almost, 90% of AIDS (Acquired Immunodeficiency Syndrome) sufferers get affected from oropharyngeal or esophageal candidiasis consistent with the colonization of the species at the infectious site.[1] Fluconazole is the preference for EC due to the fact fluconazole is commonly secured and has permits the quick clinical response and can be digested at any gastric pH.[3]

2. Materials and Methods

A prospective observational study was carried out for one year in the Teerthanker Mahaveer medical college & research center (TMMC&RC) Moradabad from January 2020 to December 2020. A total of 4,256 upper gastrointestinal endoscopy performed, Out of which 73 endoscopy results was similar to features suggestive of esophageal candidiasis were taken for *Candida* species isolation and their antifungal sensitivity test to fluconazole. All the patients included in the study were informed regarding the same and informed consent was taken. The collected sample was further processed for culture on Sabouraud Dextrose agar (SDA). Isolated colonies were identified based on cultural characteristics, gram stain for the appearance of budding yeast cells with or without pseudohyphae, growth on chromogenic medium (CHROMagar), Germ tube test for the differentiation of *Candid*a *albicans* and NAC.[2]

All species of *candida* were tested for antifungal susceptibility by disc diffusion method on Mueller Hinton Agar (MHA) supplemented with 2% Glucose and 0.5 mg Methylene blue.[4] The antifungal disc used was Fluconazole (25μg). The antifungal susceptibility of the isolates were interpreted as sensitive (S) and resistant (R) as per the clinical and laboratory standards institute (CLSI) standards.[5]

3. Result

Total 4256 patients referred to UGI endoscopy at the endoscopy unit, 73(1.7%) had found whitish plaques adhered to esophageal mucosa resembling to esophageal candidiasis. Most affected age group from this disease was found 41-60 years (48%).

3.1. Bar diagram showing age-group wise distribution of the disease

Out of 73(1.7%) samples, the isolated *Candida* species were *C.albicans* 50(68.5%), *C.glabrata* 08(11%), *C.parapsilosis* 8(11%), *C.dubliniensis* 04(5.4%), *C.tropicalis* 02(2.7%), *C.krusei* 01(1.4%).

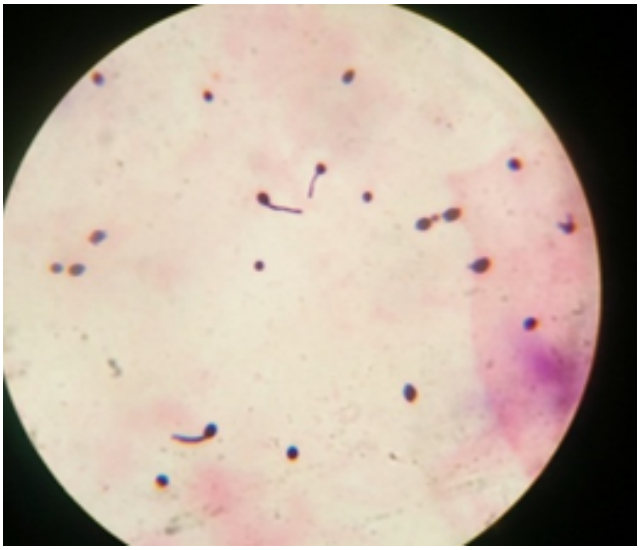

Fig. 1: Gram stain showing budding yeast cells

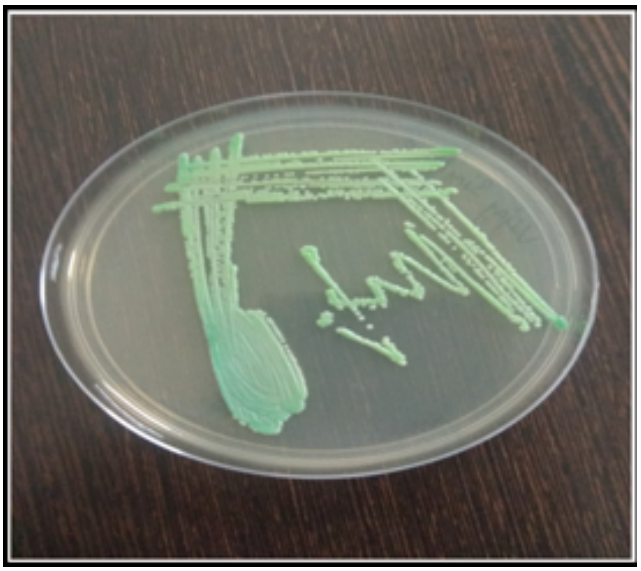

Fig. 2: *C.albicans on* CHROM

4. Discussion

Candida species are the most common cause of fungal infections, leading to a range of life-threatening, invasive to non-life threatening mucocutaneous diseases. The species are endogenous in nature and are usually responsible for opportunistic infections. In addition, there is an increased incidence of Candidiasis due to the use of various broad spectrum antibiotics, immunosuppressive drugs and corticosteroids. Prevalence rate of Esophageal candidiasis in our research center was 1.7% nearly similar to Underwood

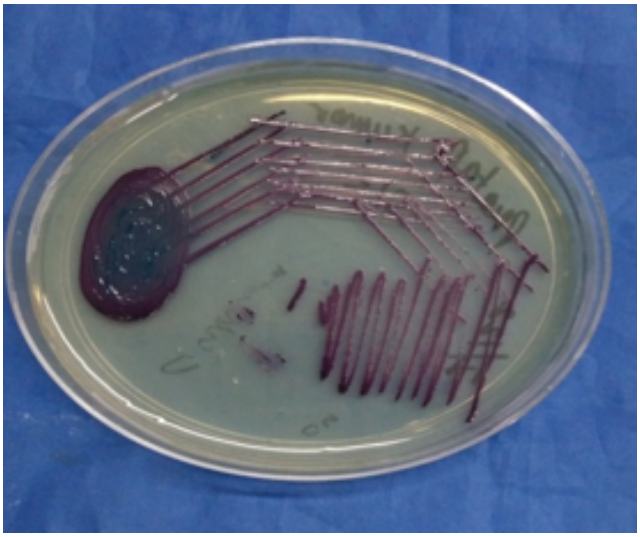

Fig. 3: *C.tropicalison* CHROM

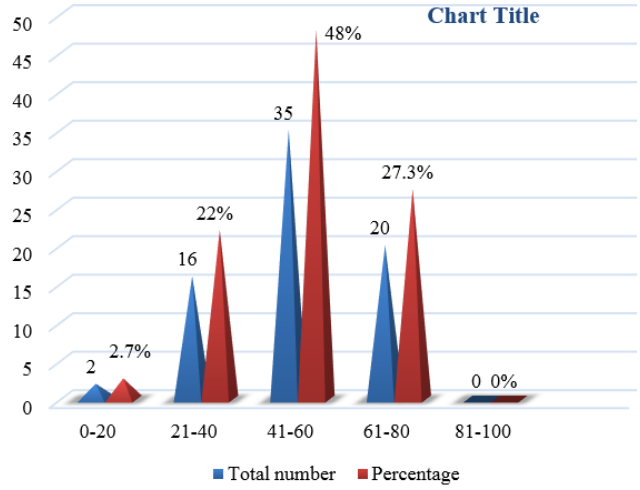

Fig. 4: A total of 15(20.6%) isolated *candida* species were found resistant to fluconazole, while 2(2.7%) had intermediate sensitivity to this drug.

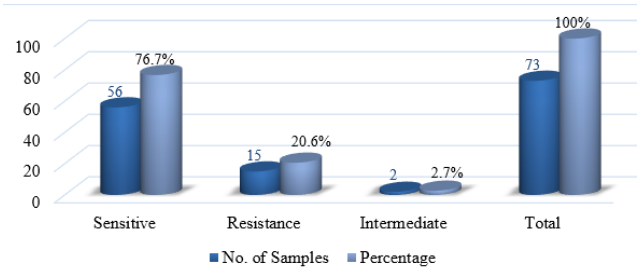

Fig. 5: Bar diagram showing AST forFluconazole

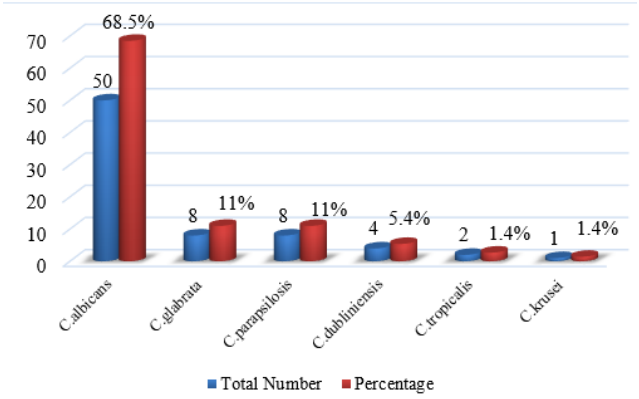

Fig. 6: Bar diagram showing frequency of *Candida* species from EC affected patients

JA et al. (2003)[6] who found 1.17% prevalence rate and another study conducted between March 2006 to April 2007 by Wilheim et al (2009)[7] found 1.5% prevalence rate of esophageal candidiasis. The dissimilarity of this result was found in the study conducted by KLIEMANN et al. (2008),[8] who found 0.74% prevalence rate. There are various reports showing increasing rate of resistant towards fluconazole specially NAC species which permits its careful use as a prophylactic agent in hospitals.

All 73 samples included in this study were found positive with esophageal candidiasis. In which 50(68.5%) patients sample has found *Candidaalbicans*, which is commonly found infectious strain of the *candida* and rest of the samples 23(31.5%) were found *Non-albicans Candida*, respectively *C.glabrata* 11%, *C.parapsilosis* 11%, *C.dubliniensis* 5.4%, *C.tropicalis* 2.7% and *C.krusei* was 1.4%, while Shafi FT et al. (2015)[9] found in his study that *Candida albicans* was frequent isolated strain (64%). Another study conducted by Nadagir SD et al. (2008)[10] in Karnataka, they found *C.albicans* and NAC percentage was 66.6% and 33.3% respectively. It may be due to various epidemiologic factors. *Candida* species are frequently found in hospital environment, food, surfaces, in most cases prior colonization has been shown. In our study the most affected age group for EC was 41-60 years (35.5%), this report was in concordance with the study conducted by Lakshmy et al.[11] where higher number of patients were from the age group of 41-60 years (71.4%), while only 40.0% patients were in the age group of < 50. Similar findings have been reported in studies by Jayachandran AL et al.[12] who reported in their study that most affected age group from Candidiasis were 41-60 years (35.5%). This can be because of attributed to the various co-morbid symptoms and health problems to this age group. This study also shows the results that Candidiasis is more diagnosed in male more than females.

As an overall result for this study we reported that there was 73 samples conducted in this study in which we found 56(76.7%) samples was sensitive to antifungal fluconazole and 15(20.6%) samples showing resistance to fluconazole, rest 2(2.7%) was found intermediate to that particular drug. In addition to this result we define every strain that there were only 50(68.5%) samples found as *Candida albicans*. In which out of 50, 38 (76%) samples found sensitive to fluconazole and 10(20%) samples shows resistance to fluconazole, rest 2(4%) found intermediate. Our finding is also agreement with the corresponding study conducted by Khadka S et al.[13] in 2017, they found 71.5% *C.albicans* sensitive to fluconazole and 17.9% was resistance to fluconazole and 10.8% were shows SDD. According to another study conducted in our institute by Ahamad I et al.[14] in 2019, they found higher resistance 36.11% in *C.albicans* for fluconazole. This pattern of resistance is in agreement with the findings of Dutta V et al. (2015).[15] Who found 23% C. albican showing resistant pattern for antifungal fluconazole. In our study we found 23 NAC species in which *Candida* glabrata showing resistance in 2(25%) samples out of 8 and same results shown for *C.parapsilosis* 2(25%) samples out of 8. Further results are C.tropicalis which is showing 0% resistance and 100% sensitivity to fluconazole. *C.krusei* that is reporting 100% resistance and last one is *C.dubliniensis* that shows 100% sensitive pattern regard fluconazole. The major cause of showing resistance pattern might be widespread use of fluconazole in various clinical problems.

5. Conclusion

The present study provided the latest information regarding the "speciation of *candida* species in patients with esophageal candidiasis and their antifungal sensitivity pattern to antifungal fluconazole" in our hospital. Esophageal Candidiasis is an emerging significant problem in patients coming in endoscopy unit. This study will also provide an opportunity to prevent infection by effective measures like awareness of esophageal candidiasis. Treatment can be initiated at an early stage leading to reduction in complications and associated health issues. This study further gives an opportunity to fight this disease untidily by clinicians and microbiologists, to validate clinical presentation of esophageal candidiasis and to understand the relation between clinically suspected and laboratory confirmed cases.

The record for increased resistance pattern to fluconazole incorporates a major concerning on the morbidity, management of those patients and need to be some various treatments. Treatment can be initiated at an early stage leading to reduction in complications and associated health issues regarding esophageal candidiasis.

6. Conflict of Interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

7. Source of Funding

None.

References

1. Choi JH, Lee CG. Prevalence and risk factors of esophageal candidiasis in healthy individuals: A single center experience in korea. *Yonsei Med J*. 2013;54(1):160–5.
2. Chander J. Textbook of Medical Mycology. 4th edn. vol. 2018. Jaypee Brothers, New Delhi;. p. 401–33.
3. Wilheim AB, Miranda-Filho DB. The resistant to fluconazole in patients with esophageal candidiasis. *Arq Gastroenterol*. 2009;46(1):32–7. doi:10.1590/s0004-28032009000100011.
4. Sowmya GS, Kulkarni M, Sumana MN, Gopalakrishnan R. speciation and antifungal susceptibility pattern of Candida isolates in tertiary care hospital: Ind. *J Med Microbiol*. 2014;3(6):108–22.
5. Clinical and Laboratory Standards Institute .Reference method for broth dilution antifungal susceptibility testing of yeasts; 4th Informational Supplement. CLSI document M27-S4. Wayne: Clinical and Laboratory Standards Institute; 2017.
6. Underwood JA, William JW, Keate RF. Clinical findings and risk factors for candida esophagitis in outpatients. *Dis Esophagus*. 2003;16(2):66–9.
7. Wilheim AB, Miranda-Filho DB. The resistant to fluconazole in patients with esophageal candidiasis. *Arq Gastroenterol*. 2009;46(1):32–7.
8. Kleimann DA, Pasqualotto AC. Candida esophagitis: species distribution and risk factors for infection. *Rev Inst Med Trop Sao Paulo*. 2008;50(5):261–3. doi:10.1590/s0036-46652008000500002.
9. Shafi FT, Padmaraj SR, Mullessery NP. Species distribution and antifungal susceptibility pattern of candida causing oral candidiasis among hospitalized patients. *Arch Med Health Sci*. 2015;3(2):247–51.
10. Nadgir SD, Chunchanur SK, Halesh LH, Yasmeen K, Chandrasekhar MR. Significance of isolation and drug susceptibility testing of non-candida albicans species causing oropharyngeal candidiasis in HIV patients. *Southeast Asian J Trop Med Public Health*. 2008;39(3):492–5.
11. Lakshmy JA, Katragadda R, Balaji J. speciation and antifungal susceptibility of esophageal candidiasis in cancer patients in a tertiary care hospital in south india. *J Med Allied Sci*. 2016;6(1):29–34.
12. Jayachandran AL, Katragadda R, Thyagarajan R, Vajravelu L. 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;p. 8758461. doi:10.1155/2016/.
13. Khadka S, Sherchand JB, Pokhrel BM, Parajuli K, Mishra SK, Sharma S, et al. Isolation, speciation and antifungal susceptibility testing of candida isolates from various clinical specimens at a tertiary care hospital. *BMC Res Notes*. 2017;10:218. doi:10.1186/s13104-017-2547-3.
14. Ahamad I, Farooq U. Isolation and identification of candidia species with their antifungal susceptibility profile in a tertiary care hospital. *Eur J Pharm Med Res*. 2019;6(3):524–7.
15. Dutta V, Lyngdoh WV, Bora I, Choudhary B, Khyriem AB, Bhattacharyya P, et al. Characterization of candida species from intensive care unit isolates in a tertiary care center in North-East India: A retrospective study. *Int J Med Public Health*. 2015;5(4):312–6. doi:10.4103/2230-8598.165961.

Author biography

Mohammad Zulfiqar Ali, Post Graduate Student

Shweta R Sharma, Associate Professor

Amit Mishra, Associate Professor

Umar Farooq, Professor& HOD

Sudhir Singh, Professor

Vasundhara Sharma, Associate professor

Imran Ahamad, Assistant Professor

Cite this article: Ali MZ, Sharma SR, Mishra A, Farooq U, Singh S, Sharma V, Ahamad I. Speciation of candida species isolated from patients with esophageal candidiasis and their antifungal susceptibility test to fluconazole. *IP Int J Med Microbiol Trop Dis* 2022;8(1):46-50.