Prevalence of fungal infections in patients attending tertiary care teaching hospital, middle Gujarat, India

Hitesh R. Ahir[1], Bhavesh P. Gohil[2,*]

[1]Assistant Professor, [2]Tutor, Dept. of Microbiology, GMERS Medical College and Hospital, Vadodara, Gujarat, India

***Corresponding Author:**
Email: bhaveshgohil08@gmail.com

Received: 6th February, 2018 **Accepted:** 2nd July, 2018

Abstract

Introduction: With the increasing number of immuno-compromised patients suffering from different types of infections, invasive fungal infections have emerged as a most common cause of morbidity and mortality in these patients. *Candida spp.* and *Aspergillus* spp. are the most common causes of fungal infection in immuno-compromised patients. Different types of *Candida non-albicans*species have emerged as a major cause of candidemia in most of the countries.

Aim: The aim of this study is to detect the prevalence of fungal infection in patients and to study their sensitivity pattern to different antifungal drugs.

Materials and Methods: The study was carried out from January'17 to December'17, to know the fungal infection prevalence, Candida albicans, Aspergillus, opportunistic fungal infections in patients of our institute. During this period total number of 2867 different clinical samples received in the microbiology laboratory for fungal culture and sensitivity testing. All other specimen received in microbiology laboratory was processed using standard microbiological guidelines for yeast and mold isolation. Susceptibility of different fungal species to antifungal agents was performed by using standard guidelines for broth dilution and antifungal disk diffusion susceptibility test.

Results: During the study period total 193 fungal species were isolated from 2867 different clinical specimens received in microbiology laboratory. Candida infection was more common in patient age group between 19-60 yrs., also in male patients and also predominates in admitted patients. Invasive fungal infection was most commonly caused by Candidanon-albicans. *C.tropicalis* was highest isolated followed by *C.albican*.

Conclusion: All *Candida* isolated were susceptible to Caspofungin. *Candida albicans* shows 26% and non-albicans shows 4% resistance to Voriconazole.

Keywords: Fungal Infection, Candida albicans, Aspergillus, Opportunistic infection.

Introduction

With the increasing number of immuno-compromised patients suffering from different types of diseases, invasive fungal infections have emerged as a most common cause of morbidity and mortality in these patients. Also the incidence of opportunistic fungal infections has increased dramatically in the past few decades, resulting from high usage of invasive medical devices and use of broad spectrum antibiotics. The advent of major surgical procedures and its complication further increased the incidence of invasive fungal diseases and associated mortality rates.[1,2]

Candida spp. and *Aspergillus* spp. are the most common causes of fungal infection in immuno-compromised patients.[2] Different types of *Candida non-albicans* species have emerged as a major cause of candidemia in most of the countries. Fungal infection increases mortality rates in the range of 18-50%.

To detect invasive fungal infection in febrile neutropenic patients is particularly difficult and time-consuming, but a delay treatment increases higher mortality.[2] Despite recognition of the clinical importance of invasive fungal infections, these infections remain difficult to diagnose and treat.[1,3,4]

The knowledge of different candida species virulence factors and their susceptibility testing is clinically very important. Early detection of yeast species is also helpful for early selection of appropriate antifungal agents.[3,5,6]

Aim

The aim of this study is to detect the prevalence of fungal infection in patients and to study their sensitivity pattern to different antifungal drugs.

Materials and Methods

The study was carried out from January 17 to December 17, to know the prevalence of fungal infections in different patients of our institute. During this period total number of 2867 different clinical samples received in the microbiology laboratory for fungal culture and sensitivity testing.

Blood samples collected in blood culture broths were processed manually. Then positive bottles sub-cultured on to Sabouraud's dextrose agar with chlormphenicol, Sheep blood agar (Hi-Media, India) to isolate yeast cells. All other specimen received in microbiology laboratory was processed using standard microbiological guidelines. *Candida* colonies were confirmed by gram stain and then identified up to species level by conventional methods like colony morphology, growth on corn meal tween 80 agar, germ

tube test, sugar assimilation/fermentation tests, urea hydrolysis and hychrome media. Yeast colonies were identified by direct mount techniques. Susceptibility testing for fungus was performed by using standard guidelines for broth dilution and antifungal disk diffusion susceptibility test. *Candida krusei* ATCC 6258 was used for quality control.

Result

During the study period total 193 fungal species were isolated from 2867 different clinical specimens received in microbiology laboratory. Out of 193 isolates, 115 (59%) isolated from male patients and 78(41%) from females. And 23 patients were from outpatient department, 158 were indoor patients and rest of 12 patients from ICU (Graph 1).

There was a significant difference in *Candida* species in different age group, sex group and also in between OPD, IPD and ICU patients. In patients age group >60 years, male and admitted patients, *Candida* infection mainly cause by non albicans.

Out of total 193 fungal isolates, 40 (20.7%) were from urine, 37(19.1%) from blood, 36 (18.6%) from stool, 34 (17.6%) from sputum, 32 (16.8%) from post-operative pus swab, 7 (3.62%) from bronchoalveolar lavage, 4 (2.1%) from frank pus, 2 (1.03%) from pleural fluid and 1(0.51%) from tissue sample.

Table 1 shows the sample wise distribution of fungal isolates. Total 188 different *Candida* species, 4 *Aspergillus* species and one *Trichosporon* were isolated. Amongst 188 *Candida* species, 69 (36.7%) were *Candida tropicalis*, 49 (26.06%) *Candida albicans*, 34 (18.8%) *Candida glabrata*, 18(9.57%) *Candida parapsilosis*, 7 (3.72%) *Candida krusei*, 3(1.59%) *Candida haemulonii*, 2 (1.06%) *Candida gullerimondi*, 1 (0.5%) each of *Candida famata* and *Candida calenulata*. And rest of four *Candida* (2.05%) isolates could not be identified up to species, considered as a *Candida* species only.

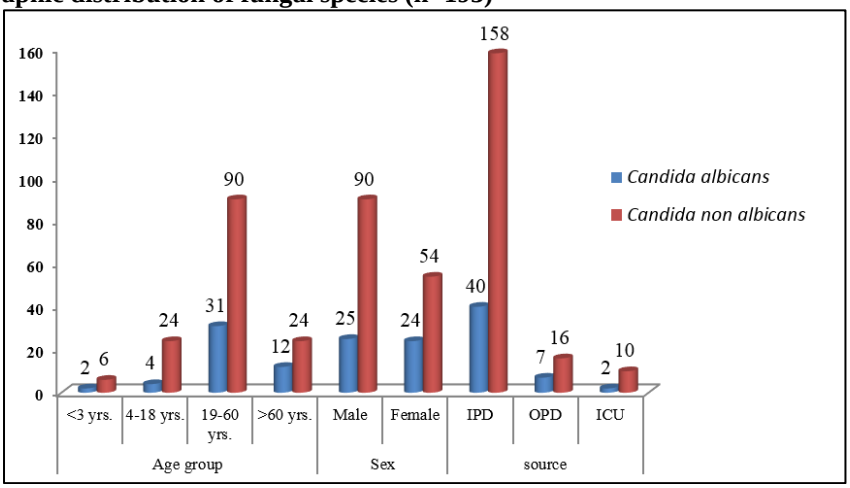
Graph 2 represents that all *Candida albicans* were susceptible to Caspofungin and Flucytosin. *Candida albicans* shows low resistance to Amphotericin B and Fluconazole. 26% albicans strains shows resistance to Voriconazole.

All Candida non albicans strains shows sensitivity to Caspofungin. And all strains show less than 8% resistance to rest of the anti-fungal drugs. (Graph 3)

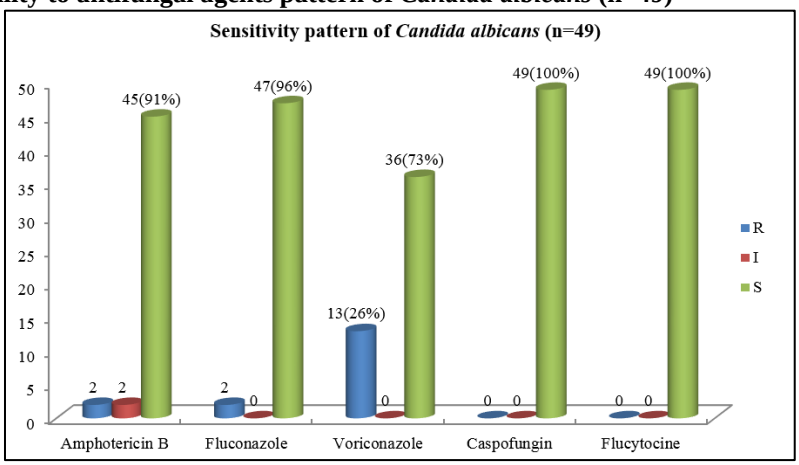
Table 1: Sample wise distribution of fungal isolates (n=193)

Organism	urine	Peripheral blood	Catheter blood	Stool	Sputum	Swab	BAL	Pus	Pleural fluid	Tissue	Total
C. albicans	8	2	0	7	16	11	4	0	1	0	49
C. tropicalis	20	7	12	6	8	9	5	1	0	1	69
C. parapsilosis	2	3	7	0	3	2	0	0	1	0	18
C. glabrata	8	2	1	12	4	2	1	3	1	0	34
C. krusei	2	0	0	1	4	0	0	0	0	0	7
C.gulliermondii	1	0	0	0	1	0	0	0	0	0	2
C. haemulonii	1	0	0	0	1	0	1	0	0	0	3
C. famata	0	0	0	0	1	0	0	0	0	0	1
C. catenulate	0	0	0	0	1	0	0	0	0	0	1
Candida spp.	2	1	1	0	0	0	0	0	0	0	4
Aspergillus flavus	0	0	0	0	3	0	1	0	0	0	4
Trichosporon	1	0	0	0	0	0	0	0	0	0	1
Total	40	37		36	34	32	7	4	2	1	193

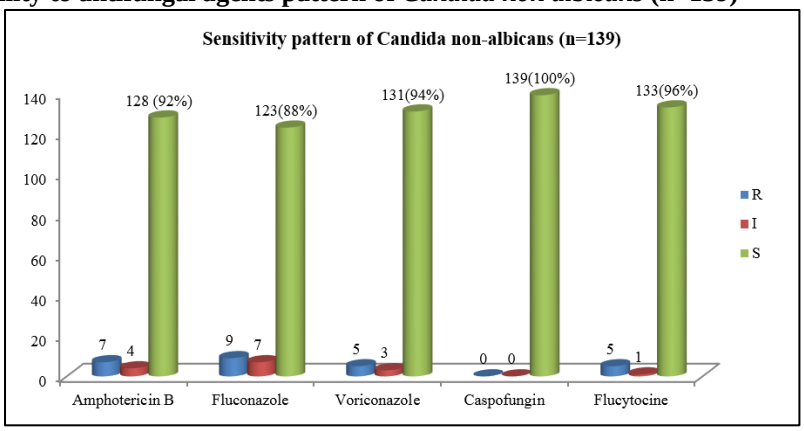
Graph 1: Demographic distribution of fungal species (n=193)



Graph 2: Susceptibility to antifungal agents pattern of *Candida albicans* (n=49)



Graph 3: Susceptibility to antifungal agents pattern of *Candida non albicans* (n=139)



Discussion

Although significant geographic variation is observed among different parts of the world, there appear to follow a specific pattern. In our study, *Candida* non-albicans were more common than *C.albicans.* This finding is correlating with other studies where non-albicans spp. predominates like in, Europe, and also in the subcontinents of India.[7-11]

Candida infection was more common in patient age group between 19-60yrs., also in male patients and also predominates in admitted patients. Invasive fungal infection was most commonly caused by Candida non-albicans. Furthermore, invasive Candida infection was mostly caused by non-albicans Candida, whereas the C.albicans was found non-invasive infection. The data in our study is highly comparable with other studies from India.[3,12,13]

In our study, amongst the non albicans *Candida*, *C.tropicalis* was highest isolated followed by *C.parapsilosis*. This is in the line with previous data from India, which that *C.tropicalis* as the most commonly isolated fungus.

Candida species differs in their susceptibility to antifungal agents. All *Candida* isolated were susceptible to Caspofungin. *Candida albicans* shows 26% and non-albicans 4% resistance to Voriconazole. A study from India shown very high resistance to Voriconazole (56%).[14] Also *Candida* non-albicans isolates showed less susceptibility to Fluconazole, Amphotericin B and Voriconazole also. The decrease susceptibility of Candida isolates to Voriconazole and some extent to Fluconazole is matter of concern although Amphotericin B, Flucytosin continue to have shown good efficacy. With various types of anti fungals available in the market, it has become necessary to perform anti-fungal susceptibility testing and reporting for effective therapeutic. Evaluation of newer anti-fungal agents is needed.

Resistance to the drugs like Voriconazole and Fluconazole as observed in this study is critical issue in treatment of immune-compromised patients with serious infection.

The Changing epidemiology of candidaemia requires monitoring of different *Candida* species and their susceptibility to use proper therapy and good result. We should also develop guideline for prophylactic empiric therapy based on the epidemiology of India.

Conclusion

Candida infection was more common in patient age group between 19-60yrs., also in male patients and also predominates in admitted patients. Invasive fungal infection was most commonly caused by Candida non-albicans. *C.tropicalis* was highest isolated followed by *C.parapsilosis*. All *Candida* isolated were susceptible to Caspofungin. *Candida albicans* shows 26% and non-albicans 4% resistance to Voriconazole.

References

1. Livio P, Morena C, Anna C, Massimo O, Luana F. The epidemiology of fungal infections in patients with hematologic malignancies: the SEIFEM-2004 study. *Haematologica.* 2006;91:1068-75.
2. Selim H, Hammouda A, Sadek N, Ahmed M, Al-Kadassy A. Fungal Infection among Patiens with some Hematopoietic Disorders. *Egypt Public Health Assoc*. 2006;81:321-33.
3. Pahwa N, Kumar R, Nirkhiwale S, Bandi A. Species Distribution and drug Susceptibility of Candida in clinical isolates from a tertiary care at Indore. *Indian Journal of Medical Microbiology.* 2014;32(1):44-48.
4. Arendrup MC, Sulim S, Holm A, Nielsen L, Nielsen SD, Knudsen JD, et al. Diagnostic issues, clinical characteristics, and outcomes for patients with fungemia. *J Clin Microbiol*. 2011;49:3300-8.
5. Murray MP, Zinchuk R, Larone DH. CHRO Magar Candida as the sole primary medium for isolation of yeasts and as a source medium for the rapid-assimilation-of-trehalose test. *J Clin Microbiol.* 2005;43:1210-2.
6. Baillie GS, Douglas LJ. Iron-limited biofilms of Candida albicans and their susceptibility to Amphotericin B. Antimicrob Agents Chemother. 1998;42:2146-9.
7. Falagas ME, Rousson N, Vardakas KZ. Relative frequency of albicans and non-albicans candidaspp among candidaemia isolates from inpatients in various parts of the world: A systematic review. *Int J Infect Dis.* 2010;14:e954-66.
8. Pfaller Ma. Diekema DJ, Sheehan DJ. Interpretive breakpoints for Fluconazole and Candida revisited: A blueprint for the future of antifungal susceptibility testing. *Clin Microbiol Rev.* 2006;19:435-47.
9. Mokaddas EM, Al-Sweih Na, Khan ZU. Species distribution and antifungal susceptibility of Candida bloodstream isolates in Kuwait: a 10-year study. *J Md Microbiol.* 2007;56:255-9.
10. Xess I, Jain N, Hasan F, Mandal P, Banerjee U. Epidemiology of Candidemia in a tertiary care centre of North India: 5-year study, Infection. 2007;35:256-9.
11. Adhikary R, Joshi S. Species distribution and anti-fungal susceptibility of Candidaemia at a multi super- specialty center in southern India. *Indian Journal of Medical Microbiology.* 2011;29(3):309-11.
12. Kothavade RJ, Kura MM, Valand AG, Panthaki MH. Candida tropicalis: Its prevalence, pathogenicity and increasing resistance to Fluconazole. *J Med Microbiol.* 2010;59:873-80.
13. Mathews Ms, Samuel PR, Suresh m. Emergence of Candida tropicalis as the major cause of fungaemia in India. *Mycoses.* 2001;44:278-80.
14. Kothari A, Sagar V. Epidemiology of Candida bloodstream infections in a tertiary care institute in India. *Indian J Med Microbiol.* 2009;27:171-2.

How to cite this article: Ahir HR, Gohil BP. Prevalence of fungal infections in patients attending tertiary care teaching hospital, middle Gujarat, India. Indian J Microbiol Res. 2018;5(3):364-367.