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Original Research Article

Frequency of candida infection among intensive care unit patients and their susceptibility profile

Ayushi Jain[1], Umar Farooq[1,*], Sudhir Singh[1], Vasundhara Sharma[1], Shweta R Sharma[1], Imran Ahamad[1]

[1] *Dept. of Microbiology, Teerthanker Mahaveer Medical College and Research Center, Moradabad, Uttar Pradesh, India*

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ABSTRACT

Background: *Candida* species are responsible for causing many health care associated and central line associated infections. They are responsible for causing opportunistic infection in human beings. Genus of *Candida* is composed of a heterogeneous group of organsims. Invasive infections of *Candida* mainly caused by *Candida albicans*, *Candida glabrata*, *Candida parapsilosis* & *Candida tropicalis*.
Aim and objective: The main objective of this study was to isolates *candida albicans* and Non- albicans *candida* and their antifungal susceptibility testing.
Materials and Methods: The study was carried out in the Department of Microbiology, in Tmu Hospital Moradabad. Total numbers of 806 clinical samples were processed in which 206 isolates were taken for *candida*. Isolation and antifungal susceptibility testing done by Vitek-2 system.
Result: Out of 206 samples 77(37%) were *C.albicans* and 129(63%) were Non-albicans *candida* (NAC). Maximum isolated species were *C.albicans* 77(37%), followed by *C.tropicalis* 70(34%), *C. parapsilosis* 24(12%), C. glabrata 19(9%), *C. dubliniensis* 12(6%), C. krusei 3(1%), C.african 1(1%).
Conclusion: Infection caused by NAC species have increased. *C.tropicalis* was the most common isolated species. *Candida albicans*, *C.glabrata* and *C.krusei* were shown high susceptibility to fluconazole and voriconazole. Amphotericin B, Caspofungin, Micafungin and Flucytosine shows high susceptibility towards other candida species.

1. Introduction

Incidence of fungal infections has been arising globally and found most commonly caused by *Candida* species. *Candida* species are responsible for causing many health care associated and central line associated infections.[1]

Nosocomial infection are concerned more with medical device leading to dreadful consequences like systemic infection that could be life taking, also complicated by destruction of internal tissue.[2] Mortality rate is 50% in patients of blood stream infection.[3]

Among Human immunodeficiency virus (HIV) patients and other immunocompromised patients oral candidiasis is very commonly caused by *Candida albicans*.[4] In women it colonizes genital area causing vagina candidiasis leading to vaginal thrush.

Even though researchers have pointed out that *Candida* might be causative factor for mucositis of digestive tract, part played by catheter in patients with unusal lower number of neutrophils is still not understood in comparison to patients of intensive care unit (ICU).[5]

The cases of infection caused by *Candida albicans* have been reduced in number but rate of Non-albicans species have been increased.[6]

* *Corresponding author*.
E-mail address: farooqzf@yahoo.com (U. Farooq).

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Antifungal resistance by non-albicans *Candida* provisions the quick, early and accurate identification and is vital because of an increase in evidence of epidemiological shift of causative agents from C.albicans to non-albicans *Candida*.[7]

2. Material and Methods

The study was carried out in the Department of Microbiology, in Tmu Hospital Moradabad.

Total numbers of 806 clinical samples were processed in which 206 isolates were taken for *candida*. Sample was collected from various ICU's and various other clinical departments of the hospital. The different clinical specimens like blood, E.T aspirates, BAL fluid, throat swab, urine, high vaginal swab, Foley's catheter tip and Venous catheters were taken.

2.1. Sample Processing

1. Respiratory samples were inoculated on Blood Agar and SDA. Urine samples were inoculated on CLED Agar and incubated at 37^0 for 24-48 hrs.
2. The collected blood samples were inoculated into the culture bottle for blood culture and positive blood culture were indicated by change in the color on the screen of BacT ALERT 3D.[8]
3. Positive blood culture were proceeded for subculture and were incubated at 37 ^{0}temp for 24-48 hrs .
4. Colonies have been identified on the basis of colony morphology and culture characteristics. After gram's staining Speciation and Antifungal sensitivity pattern was done by Vitek-2 system.

2.2. Identification & Antifungal Suceptibility Testing

Identification, speciation and antifungal susceptibility of *Candida* species was done by automated method.

Identification of *Candida* species was done by VITEK 2 with 2 YST Card & antifungal susceptibility was done with VITEK 2 AST-YSO7 Card.[8]

2.3. Sample preparation[9]

1. 24hr old culture was tested. Cassette of Vitek 2 compact labeled with barcode was selected and the no. of cassette were defined.
2. In the cassette, polystyrenes tube was placed and 3ml of Vitek saline was taken in these tubes.
3. After that by using sterile loop the isolated colonies were emusified in Vitek saline. A uniform suspension was made.
4. Inoculum was checked by Densicheck plus. McFarland standard (Vitek 2.20 YST and Vitek 2 YST Card) was checked by Densichek.
5. Cards were prepared for inoculation.
6. Pre-inserted Vitek 2.20 YST Vitek 2 YST Card, were transferred into selected polystyrene tubes from the corresponding suspension.
7. Then all the prepared inoculums in cassette were loaded into the instrument in filler section.

2.4. Loading of sample

Prepared Cassette were loaded into the filler section of instrument, after that door was closed.

The User Interface Screen was pressed and it was completed in 70seconds cycle. Blue indicator light was flashed when the filling cycle was completed. Cassette was removed from the filler section and loaded into the load section within 10 minutes. Barcodes were scanned & checked against the maintain Virtual Cassette electronic work list. Straws were cut and taped up. Finally, Cards were loaded into carousel.

The cassette wastes were discarded and it was indicated by flashing blue arrow on the instrument. The loading was completed.

2.5. Result reading

The result generated as genus-level, group-level identification, while Vitek 2 AST-YSO7 Card estimates the sensitivity and resistance to Fluconazole, Voriconazole, Amphotericin B, Micafungin, Caspofungin and Flucytosine.

3. Result

The samples were obtained from the patients admitted in ICU's of Hospital. Out of 806, total 206 *Candida* isolate from various clinical specimen from different ward of intensive Care Unit.

Table 1: Showing out of 206 (100%) samples 77 (37%) were C.albicans and 129 (63%) were NAC.

Species	Number	Percentage
C.albicans	77	37%
NAC	129	63%
Total	206	100%

Table 2: Showing Sex wise distribution. The *Candida* infection were more in male in contrast to female.

Sex	Number	Percentage
Male	(n=140)	68%
Female	(n=66)	32%
Total	(n=206)	100%

Maximum isolated species were C.albicans 77(37%), followed by C. tropicalis 70(34%), C. parapsilosis 24(12%), C. glabrata 19(9%), C. dubliniensis 12(6%) ,C. krusei 3(1%), C.african 1(1%).

Table 3: Sensitivity of *C.albicans* to amphotericin-B was 92%, 90% to Caspofungin, 84% to Micafungin, 78% to Flucytosine, 66% to voriconazole and least sensitive 50% to fluconazole. Sensitivity of *C. tropicalis* to Amphotericin-B, Micafungin, and Caspofungin was 100%, 97% to Flucytosine, 91% to fluconazole and voriconazole. *C. glabrata* showed 89% sensitivity towards Amphotericin-b & Flucytosine, 79% to Caspofungin and Micafungin, 13% to voriconazole, 12% to fluconazole. *C. parapsilosis* showed 100% sensitivity towards Caspofungin, Micafungin, Amphotericin-B and Flucytosine. Sensitivity of *C. dubliniensis* to amphotericin-b was 100%, 91% to fluconazole, voriconazole, Micafungin, Caspofungin and Flucytosine. *C. krusei* was resistant to fluconazole, 67% sensitive to amphotericin-b, Micafungin, Caspofungin and Flucytosine, 33% was sensitive to voriconazole. *C.african* showed 100% sensitivity to azole group, Amphotericin-B, Micafungin, Caspofungin & Flucytosine.3

Species (No.)	Fluconazole No.(%)	Voriconazole No.(%)	Caspofungin No.(%)	Micafungin No.(%)	Amphotericin-B No.(%)	Flucytosine No.(%)
C.albicans (n=77)	50(65%)	51(66%)	69(90%)	65(84%)	71(92%)	60(78%)
C. tropicalis (n=70)	64(91%)	64(91%)	70(100%)	70(100%)	70(100%)	68(97%)
C.glabrata (n=19)	12(63%)	13(68%)	15(79%)	15(79%)	17(89%)	17(89%)
C. parapsilosis (n=24)	23(95%)	22(91%)	24(100%)	24(100%)	24(100%)	24(100%)
C. dubliniensis (n=12)	11(91%)	11(91%)	11(91%)	12(100%)	11(91%)	11(91%)
C.krusei (n=03)	00	01(33%)	02(67%)	02(67%)	02(67%)	02(67%)
C.african (n=01)	01(100%)	01(100%)	01(100%)	01(100%)	01(100%)	01(100%)

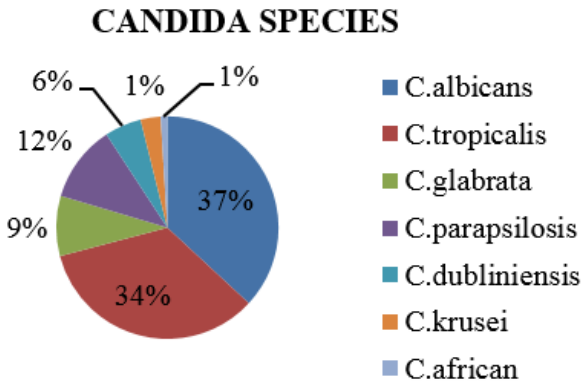

Fig. 1: Pie chart showing distribution of species of *Candida*.

4. Discussion

Infection caused by *Candida* has been increasing gradually. *Candida* species normally present as commensal of the human body but capable of causing opportunistic infection especially in immunocompromised individual.[10]

Although, infection caused by *C. albicans* is very common but recently infection of NAC is increasing. NAC species are gaining importance in recent years because they show resistance to antifungal drugs. In our study, percentage of non albicans *Candida* (62.6%) was higher than *Candida albicans* (37%). Identical study was conducted by Sundaram M et al[9] concluded that NAC (57%) was higher than C.albicans (43%). While in a study conducted by Lerory O et al[11] C. albicans (57.0%) were isolated more as compared to Non-albicans *Candida*.

In our present study albicans isolated was 37% and in NAC most commonly isolated species was *C. tropicalis* (33.9%) followed by *C. parapsilosis* (11.6%), *C. glabrata* (9.2%), C. dubliniensis (5.8%), *C. krusei* (1.4%) and C.african (0.4%).A study done by Ahmad I et al[12] had similar percentage that *C.albicans* isolated was 36% and in NAC most commonly found species was *C. tropicalis* (40%) followed by *C. glabrata* (10%), *C. dubliniensis* (9%) and *C. krusei* (2%).

Our study showed that the rate of *Candida* infection were more in male 67% than in female 36%. This result is comparable with other study conducted by Yashavanth R. at el[13] where 62.12% of *Candida* was isolated in male and 37.87% in female. this is contrast to the study conducted by Kauffman C et al.[14] which showed *Candida* were more isolated in female 54.7% than male 45.3%.

In our study, *C.albicans* showed 35%, 34%, 22% resistance to fluconazole, voriconazole and Flucytosine but showed least resistance to Micafungin 10%, Caspofungin 10% and 8% to amphotericin-b. More resistance to azole was seen in C.albicans and this was comparable to a study conducted by Rajeevan et al.[15]

All isolated *C. krusei* were resistance to fluconazole which was comparable to the study done by Mondal et al.[16] C. krusei was 67% susceptible to Caspofungin, Micafungin, amphotericin-b, Flucytosine and only 33% susceptible to voriconazole.

C. parapsilosis showed 100% susceptible to Micafungin, Caspofungin, amphotericin-b and Flucytosine. Only some showed resistance to azole group, 9% to voriconazole

and 5% to fluconazole. In contrast Jangla S M et al.[17] found 100% sensitivity to azole group, amphotericin-b, Micafungin, Caspofungin, Flucytosine among all *Candida* species.

C. tropicalis showed 100% susceptibility to Micafungin, amphotericin-b and Caspofungin. But showed 9% resistance to fluconazole & voriconazole, 3% resistance to Flucytosine. C. dubliniensis showed 100% susceptible to Micafungin and 91% susceptible to rest of the antifungal drug used in our study.

5. Conclusion

Infection caused by Non albicans *candida* (NAC) species has been increased. *C. tropicalis* was the most common isolated species. Candida *albicans*, *C.glabrata* and *C.krusei* showed high susceptibility to fluconazole and voriconazole. Amphotericin B, Caspofungin, Micafungin and Flucytosine showed high susceptibility towards other candida species.

Our study concluded that VITEK 2 was more accurate and less time consuming as comparative to conventional methods. Identification of *candida* species and their antifungal susceptibility are important for the treatment of immunocompromised patients and patient with serious underlying disease.

6. Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

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Author biography

Ayushi Jain, Post Graduate Student https://orcid.org/0000-0002-8513-4408

Umar Farooq, Professor and HOD

Sudhir Singh, Professor

Vasundhara Sharma, Associate Professor

Shweta R Sharma, Associate Professor

Imran Ahamad, Assistant Professor

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