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ISOLATION AND IDENTIFICATION OF CANDIDA SPECIES WITH THEIR ANTIFUNGAL SUSCEPTIBILITY PROFILE IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Introduction: Yeasts are the fourth most common organism recovered from blood culture in hospital. There has been a significant increase in the number of reports of mucosal and systemic *Candida* infections with *non-albicans Candida* (NAC) species. Systemic *Candida* infections are the common to immunocompromised individuals, including human immuno deficiency virus (HIV) infected patients, transplant recipients, chemotherapy patients, and low-birth weight infants.[6] *Candida* species were initially susceptible to azoles group but now some species have developed resistance to the Azoles. **Aim:** Isolation and identification of candida species with their antifungal susceptibility profile in a tertiary care hospital. **Material & Methods:** The study was conducted in the Department of Microbiology, Teerthanker Mahaveer Medical college & research centre Moradabad. Candida species isolated from various clinical samples were include in the study. The isolates were identified as per standard mycological protocol. The antifungal susceptibility profile of candida isolates was determined by disc diffusion method. **Result:** During the study period a total 1156 were processed out of which 100 isolates were taken for *Candida*. NAC species was predominant isolates. *C.tropicalis* were the major isolates from NAC species. Highest resistance was seen against fluconazole among both *C.albicans* and NAC. **Conclusion:** The present study highlights the predominance of NAC species in ICU patients similar to the trends in various study in our country. The present study highlighted the need for periodic surveillance of antifungal susceptibility pattern to preventing the emergence of drug resistance.

KEYWORDS: *Candida* species, Non-albicans candida, Immunocompromise Antifungal resistance.

INTRODUCTION

Yeasts are the fourth most common organism recovered from blood culture in hospital. There has been a significant increase in the number of reports of mucosal and systemic *Candida* infections with *non-albicans Candida* species.[1] *C.albicans* is an opportunistic fungal pathogen. It is a common fungal disease found in human is effecting skin, nails, mucosa and internal organs of the body.[2] Fungal infection account for nearly about 8% of all nosocomial infections, In which 80% cases the responsible agent is *Candida*.[3] It has been observed that *Candida* species are one of the four most common causes of cardiovascular and bloodstream infections in United state (US) hospitals.[4] Bloodstream infections caused by *Candida* species are responsible for as high as 50% mortality rate among the infected patients.[5] The incidence of these infection has increased dramatically over the past two to three decades and this trend will inevitably continue in 21st century.[6]

In the past decade, there is increased susceptibility to opportunistic fungal infections of which majority are caused by yeasts and yeast like fungi. *Candida* species were initially susceptible to azoles group but now some species have developed resistance to the Azoles.

MATERIAL AND METHODS

The study was conducted in the Department of Microbiology, Teerthanker Mahaveer Medical college & research centre (TMMC & RC) Moradabad over a duration of one and half years (from January 2017 to June 2018). A total of 1156 clinical samples were processed out of which 100 isolates were taken for *Candida*. The sample was received from different ICUs/Ward like medicine intensive care unit (MICU), Paediatric intensive care unit (PICU), neonatal intansive care unit (NICU), surgery intensive care unit (SICU) and Obs. & gynaecology. The different clinical samples which yielded the growth of candida were included in the study and samples which yielded organisms other than candida were excluded.

All the clinical samples i.g., urine (744 sample), blood (172 sample), throat swab (121 sample), respiratory sample (86 sample) and foley's catheter (34 sample) were examined by KOH preparation. For speciation cultured onto CHROMagar and incubated aerobically at 30^0 C for 48 to 72 hours.[7]

Antifungal susceptibility testing of candida

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.[8] The antifungal discs used were Amphotericin B (50µg), Fluconazole (25 µg), Nystatin (50µg) and Voriconazole (1µg). The antifungal susceptibility of the isolates were interpreted as sensitive (S) and resistant (R) as per the clinical and laboratory standards institute (CLSI) guidelines.[9]

RESULT

During the study period a total 1156 clinical samples were collected in which, 100 were candida. Among these isolates, *candida* infection was more predominant in males then to females. As show in the figure 1 *Candida* species were isolated more in males 66 (66.00%) than females 34 (34.00%). Maximum no. of *C.albicans* and NAC were isolated from urine sample (67%) followed by blood(17%), respiratory samples(8%), catheter(5%) and throat swab (3%). Figure 2 shows sample-wise distribution of candida species.

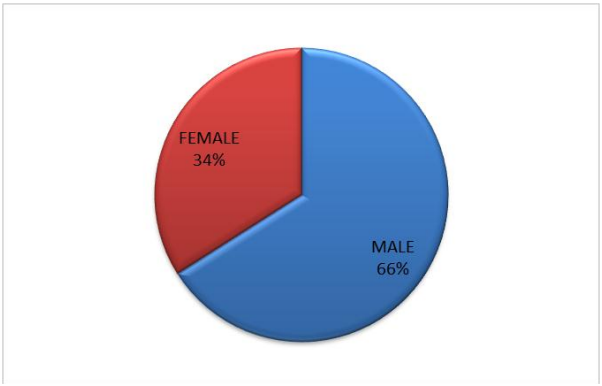

Figure.1: Pie diagram showing the sex-wise distribution in patients

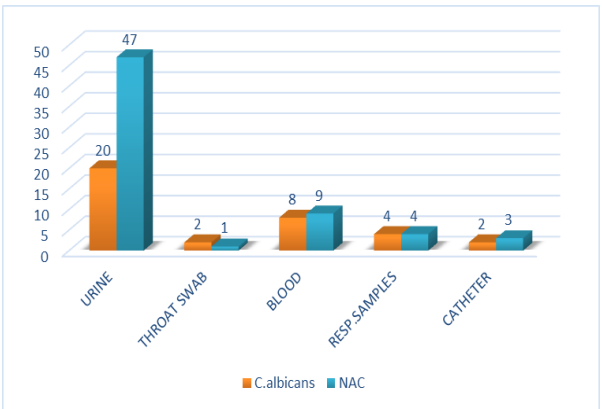

Figure.2: Bar Diagram showing Sample-wise distribution of candida species.

In the present study, the most common risk factor were diabetes mellitus (37%) followed by Prolonged Antibiotics (24%), others (21%), corticosteroids (16%) and prematurity (2%).Others include patients with chronic kidney disease, burns and patients who underwent surgery. Figure 3 shows the risk factors associated with candidiasis.

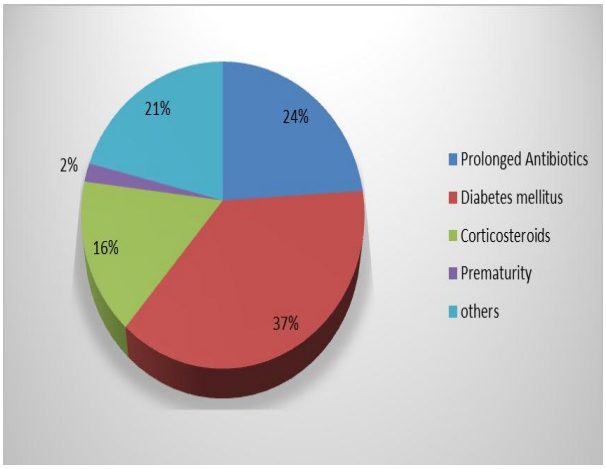

Figure.3: Pie diagram showing distribution of various risk factors.

Out of 100 Candida species, 36 were *C.albicans*, while *non-albicans Candida* (NAC) were 64. The most frequently isolated *Non-albicans Candida* was *C.tropicalis* 40 followed by *C.glabrata* 10, *C.dubliniensis* 9, *C.parapsilosis* 3 and *C.krusei* 2. Figure 4 shows *Candida* species isolated from different ICUs/ward.

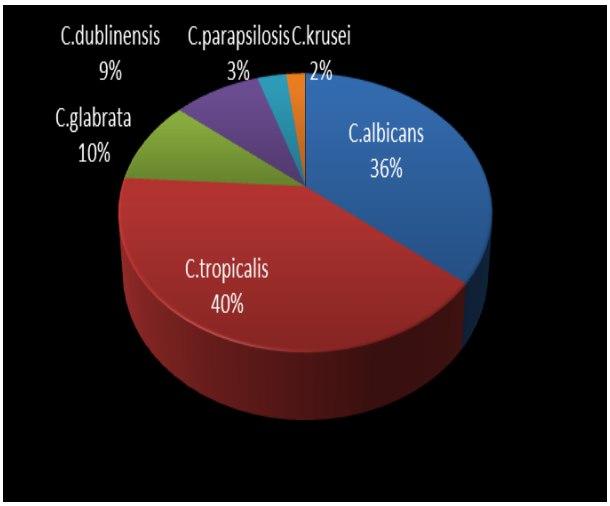

Figure.4: Pie diagram showing *Candida* species isolated from different ICUs/ward patients.

Antifungal susceptibility profile of candida isolates is showing in figure 5. The resistance to fluconazole was highest among *C.albicans* and NAC. Among *C.albicans*, least resistance was seen towards voriconazole 16.67%, whereas 34.37% NAC showed resistance to voriconazole.

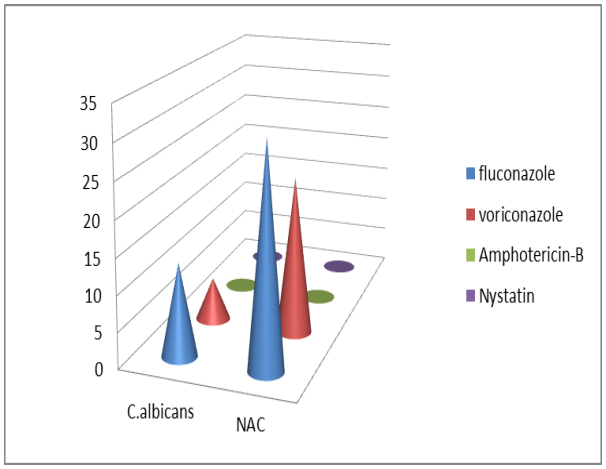

Figure.5: showing resistant pattern of *candida* species.

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 in ICUs and NICUs. In the present study, out of 1156 clinical specimens received, a total of 100 samples were found positive for *Candida* species. It was mainly isolated from urine followed by blood, throat swab, respiratory samples and catheter (foley's /I.V catheter). In our study, maximum numbers of *Candida* species (67.00%) were isolated from urine samples. Singh T *et al.*, found most of *Candida* spp. from urine samples (74.7%) in their study,[10] While Chaudhari B K *et al.* found maximum numbers of *Candida* isolates from blood (74%), followed by urine (18%).[11] In our study, male patients outnumbered the females, with a male to female ratio of 1.94:1. Our finding is also similar to the corresponding figure of 1.7:1, reported by Gonzalez de Molina *et al.*[12] In our study the most significant risk factor were Diabetes mellitus, followed by patients on treatment with Broad spectrum antibiotics, immunocompromised, corticosteroids and prematurity. In a study by Arora *et al*. with candidemia, most common risk factor was use of intravenous catheter(63%) followed by prolonged use of antibiotics (35%) and immunosuppression(23%).[13] Shivaprakasha *et al*. showed that risk factors associated with non-albicans *Candida* in blood were intensive care unit stay (74.6%), antibiotic therapy (50.8%),central line (42.4%), urinary catheter (32.2%), ventilator (23.7%), malignancy(20.3%)and abdominal surgery(15.3%).[14] In the present study, we observed that NAC species were more frequently (64.00%) encountered than *C.albicans* (36.00%). Sowmya G.S et.al. reported high rate of infections due to NAC species (87.5%) whereas infections due to candida albicans constituted only about (12.5%).[15] This is in contrast to the study conducted by Leroy O *et al*., which showed a higher isolation (57.0%) of *C.albicans* as compared to NAC.[16]

Among the non-albicans *Candida* (NAC) species, *C.tropicalis* was most common isolate (62.50%) in our study which is consistent to finding by Singh T *et al.*, reported (85.2%)[10] while in a study conducted by Leroy O *et al*. *C.glabrata (*16.7%) were isolated more as compared to *C.tropicalis* (4.9%).[16] Azoles are safe and effective agents for treatment of candidiasis and have gradually replaced amphotericin B. However, resistance to azoles is now becoming common. Azoles are safe and effective agents for treatment of candidiasis and have gradually replaced amphotericin B. However, resistance to azoles is now becoming common. All the isolates (*C. albicans* and NAC) in the current study showed no resistance to Amphotericin B and Nystatin which is in concordance with Gupta *et. al*., reported no resistance to Amphotericin B and Nystatin.[17] In our study, *C. albicans* and NAC showed maximum resistance to fluconazole (36.11% & 48.43% respectively) which is similar with the finding of Sharma *et.al.*,Gupta *et. al*., and Binesh *et al.*[17-19]

CONCLUSION

Candidiasis is emerging as a significant problem in hospitalized patients especially in ICUs setup. Isolation and antifungal sensitivity of *Candida* species from ICU patients will help in building a data center of the prevalent *Candida* species along with their antifungal resistance profile and will go a long way in the management of these serious patients. The present study highlighted the need for 'periodic surveillance' of antifungal susceptibility pattern of the prevalent *Candida* species as it would enlighten the judicious use of antifungal drugs in patients and thus preventing the emergence of drug resistance.

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