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Candida tropicalis:An emerging pathogen in Septicaemia

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ABSTRACT

Candidemia refers to presence of *Candida* species in Blood. Candidiasis is a primary or secondary fungal infection involving a member of genus *Candida*. The increasing use of prophylactic antifungal agents to prevent *Candida* infections has led to emergence of resistant species. They are endogenous opportunists which cause secondary infection in individuals with underlying immunocompromised conditions.

Fungal sepsis is common infection among neonates in NICU, especially preterm and very low birth weight babies. Candidiasis is one of the most common infectious diseases which complicates the control of diabetes. The most common opportunistic fungal infection in HIV positive patients is candidiasis, affecting the mucocutaneous system mainly but the invasive form is also common. The synergistic growth promoting association of *Candida* along *Mycobacterium tuberculosis* has raised increased concern for studying the various *Candida* species and its significance.

The aim of this study was to identify the *Candida* species isolated from bloodstream infections and study the antifungal susceptibility pattern to initiate antifungal treatment promptly.

Blood samples were collected in Brain heart infusion broth and incubated at 37°C for 24hours. Next day it was cultured on Blood agar and MacConkey agar for bacteria and Sabouraud dextrose agar for *Candida* species. The suspected *Candida* isolates were identified by standard mycological techniques like Gram staining, Germ tube test, Dalmau Plate culture CandidaHiChromagar and Sugar assimilation test. They were also subjected to antifungal susceptibility testing.

Out of 50 clinically suspected cases of septicaemia, 15 (30%) showed the growth of *Candida* species. Of these, 10(66.66%) were identified as *Candida tropicalis*and five (33.33%) *Candida albicans*.

There is progressive epidemiological shift in *Candida* species from *C.albicans* to non albicans *Candida* species. Non-albicans *Candida* are gaining importance as cause of neonatal septicaemia. Early diagnosis of invasive candidiasis is critical in order to initiate antifungal agents promptly.

1. Introduction

Yeasts were always identified as etiological agents of human infections. *Candida* often regarded as contaminant in laboratories has emerged as potentially aggressive pathogen today. The rise of systemic *Candida* infections is related with several factors like immunocompromised status -HIV, excessive use of broad-spectrum antibiotics and metabolic disorders [1]. Clinicians now depend in identification of *Candida* to the species level in order to optimize the selection of antifungal agents, to allow them to provide the best possible patient care. Therefore, this study was undertaken to study *Candida* species in Blood samples.

2. Material and Methods

A total of 50 clinically suspected cases of Septicaemia were included in our study. For blood culture, samples were collected in brain heart infusion broth and incubated. This is followed by inoculation on Sheep Blood agar, MacConkey agar and Sabouraud dextrose agar (SDA) with chloramphenicol. The suspected growth on Sabouraud dextrose agar was further studied by Germ tube test, Dalmau plate culture, Candida HiChrom agar, Cornmeal agar to study chlamydospore and blastoconidia formation andSugar assimilation test was carried out for confirmation of species. [2]

The isolates were subjected to antifungal susceptibility testing to Fluconazole, Ketoconazole, Itraconazole, Nystatin and Amphotericin B by disc diffusion method. Susceptibility testing was conducted and reported as per the Clinical and Laboratory Standards Institute guidelines [3].

3. Results

Table 1: Distribution of *Candida* species isolated from Blood samples

Department	Isolates of *Candidatropicalis*	Isolates of *Candida albicans*
Respiratory Medicine	6	3
Neonatal ICU	4	2

Table 2: Invitro antifungal susceptibility pattern of *Candida* species (Total-15)

Antifungal Agent	Disc Potency	Number of strains Sensitive (%)	Number of Strains Resistant (%)
Ketoconazole	10 µg	11(73.33)	4(26.66)
Itraconazole	10µg	12(80)	3(20)
Fluconazole	10µg	6(40)	9(60)
Nystatin	100units	14(93.33)	1(6.66)
Amphotericin B	100units	14(93.33)	1(6.66)

Table 3: Antifungal susceptibility pattern of each *Candida*tropicalis(10)species

Sr No	Candida species	Ketoconazole (10 µg)	Itraconazole (10µg)	Fluconazole (10µg)	Nystatin (100units)	Amphotericin B(100units)
1	*C.tropicalis*	Sensitive	Sensitive	Sensitive	Sensitive	Sensitive
2	*C.tropicalis*	Sensitive	Sensitive	Resistant	Sensitive	Sensitive
3	*C.tropicalis*	Resistant	Sensitive	Resistant	Sensitive	Sensitive
4	*C.tropicalis*	Resistant	Sensitive	Resistant	Sensitive	Sensitive
5	*C.tropicalis*	Sensitive	Sensitive	Sensitive	Sensitive	Sensitive
6	*C.tropicalis*	Sensitive	Sensitive	Resistant	Sensitive	Sensitive
7	*C.tropicalis*	Sensitive	Resistant	Sensitive	Sensitive	Sensitive
8	*C.tropicalis*	Sensitive	Resistant	Sensitive	Sensitive	Sensitive
9	*C.tropicalis*	Resistant	Sensitive	Resistant	Sensitive	Sensitive
10	*C.tropicalis*	Sensitive	Sensitive	Resistant	Sensitive	Sensitive

Table 4: Antifungal susceptibility pattern of each *Candidaalbicans*(5)species

Sr No	*Candida* species	Ketoconazole (10 µg)	Itraconazole (10µg)	Fluconazole (10µg)	Nystatin (100units)	Amphotericin B(100units)
1	*C.albicans*	Sensitive	Sensitive	Sensitive	Sensitive	Sensitive
2	*C. albicans*	Sensitive	Sensitive	Resistant	Sensitive	Sensitive
3	*C albicans*	Sensitive	Resistant	Resistant	Sensitive	Sensitive
4	*C. albicans*	Resistant	Sensitive	Resistant	Resistant	Resistant
5	*C albicans*	Sensitive	Sensitive	Sensitive	Sensitive	Sensitive

4. Discussion

Fungal sepsis should be suspected in a critically ill neonate with negative blood culture. So, an attempt was made to process for *Candida* simultaneously.

Out of 50 blood samples, 15 species of *Candida* were isolated. Six from neonate and nine from respiratory medicine department. Of the nine patientsfive were suffering from tuberculosis, three were diabetic, and a single from HIV and tuberculosis patient. The neonates were provisionally diagnosed as Sepsis and low birth weight. Kapila *etal[4*] also has reported that low birth weight was the commonest risk factor associated with candidemia in babies, followed by prematurity.

Lydia Rajakumari M *et a*l [5], in their study, also found that the prevalence of *Candida* species in diabetic individuals was higher when compared with nondiabetic healthy individualsAntifungal choice is first based on *Candida* species identification. Resistance to Fluconazole in clinical isolates of *C.tropicalis*has increased. Our study showed resistance of 60%. Yang et al[6] in Taiwandescribed a higher incidence of Fluconazole resistancein *Candida tropicalis.*Resistance to fluconazole in clinical isolates of *C. tropicalis* has increased [7,8]. *Antifungal* susceptibility testing of our isolates revealed that all isolates were sensitive to Nystatin and Amphotericin B. According to G Marshal [9], and Sumana*etal*[10] fluconazole exhibited good activity against most species of *Candida*.

5. Conclusion

Characterization of *Candida* species helps in identifying the intrinsically resistant species. Fungal infections are associated with high mortality in critically ill patients and delayed antifungal treatment contributes to poor outcome. Antifungal susceptibility testing enables clinicians in optimizing the selection of antifungal agents and hence more rational and customized therapy which shall help in decreasing patient morbidity and mortality. Candida tropicalis has been identified as the most prevalent pathogenic yeast species of the *Candida*-non-albicans group. The successful treatment of *Candida* infections in blood depends on the rapid identification of the species and sensitivity patterns to antifungal agents.

Rapid species identificationfrom clinical specimens and standard drugsusceptibility testing would be an effective approach forcontrolling nosocomial outbreaks caused by C. tropicalisor non albicans Candida species in different clinical settings.

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FIGURES

Figure 1:Chlamydospore formation

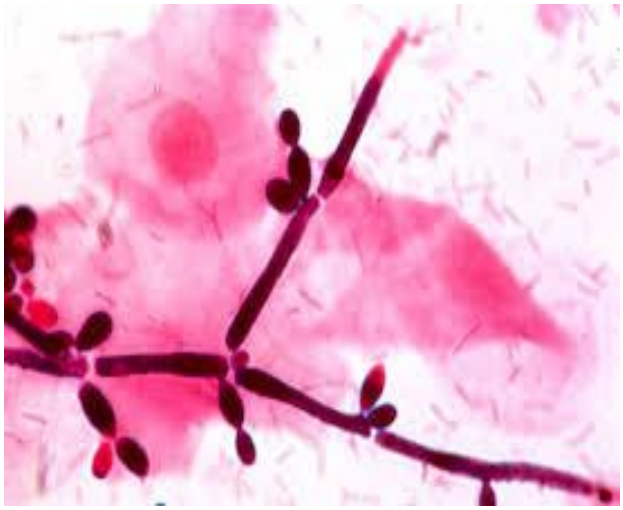

Figure 2: Grams Staining

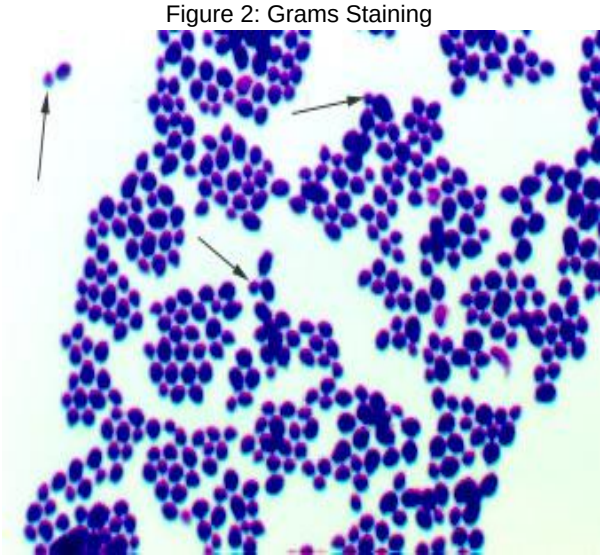

Figure 3: Growth of *C.tropicalis* on HiChrom Agar

Figure 4: Growth of *C.albicans* on Hichrom agar

Figure 5: Antifungal susceptibility testing on Muellor Hinton agar with methylene blue