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CHARACTERISATION AND ANTIFUNGAL SUSCEPTIBILITY PATTERNS OF CANDIDA SPECIES ISOLATED IN TERTIARY CARE HOSPITAL IN NORTH INDIA.

Microbiology

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ABSTRACT

Candida is usually considered a commensal with the potential to cause opportunistic infections ranging from superficial mucosal infections to life-threatening invasive infections. This study was aimed to determine antifungal susceptibility patterns of Candida species isolated from various clinical specimens from a tertiary care hospital. **Material and Methods:** Isolation and identification of Candida species were done by morphological examination, pseudohyphae, and chlamydospore production on cornmeal agar, germ tube test, and HiCrome Candida differential agar. The antifungal susceptibility of Candida strains was performed by the disk diffusion method as per the CLSI M44-A2 protocol. **Result:** A total of 96 Candida species were isolated from various clinical specimens. The isolation rate was more in the older age group and female patients(52%). Most frequently isolated from urine 41.67% followed by sputum 19.79%, Blood 16.67%, and least from vaginal swab 2.08%. Four species of Candida were isolated among them Candida albicans was most common 59.37% followed by Candida prapsilosis and Candida krusei 15.62%, and Candida tropicalis 9.37%. In antifungal susceptibility testing, Itraconazole was the most sensitive drug and Fluconazole was the least sensitive one with only 58.33% susceptibility among individual species.
Concussion: Urinary tract infection was common due to Candida albicans, and Itraconazole was the most susceptible drug.

KEYWORDS

Antifungal drugs, Candida species, Clinical specimens, Itraconazole

INTRODUCTION:

Candida which was considered a commensal has emerged as a major cause of human infections over the last few decades. [1] Candida albicans which was earlier considered the most common species are now being replaced by the non-albicans ones. These species can cause a wide range of human diseases ranging from superficial mucosal infections, such as vulvovaginal and oropharyngeal candidiasis, to life-threatening invasive infections. [2] In India, candida infections are on the rise, with *Candida albicans* being the most common. Many reports had an increased rate of infection with non-*Candida albicans* species like *C. glabrata, C. parapsilosis, and C. tropicalis,* which presently have been recorded among etiological organisms. [3] Antifungal agents are available for the treatment of systemic and invasive candidiasis. [4] Fluconazole is an antifungal agent most commonly used for prophylaxis as it can be administered orally and is comparatively cheaper than other antifungal agents. [5] The study aimed to study the incidence of different *Candida* species and determine antifungal susceptibility patterns.

MATERIALS AND METHODS:

The isolation of *Candida* species was done from various clinical specimens like Blood, Urine, Sputum, Pus, Body fluids, etc submitted for routine culture and sensitivity in Mayo Institute of Medical Sciences and Hospital, Barabanki from 2018 to 2019. The specimens were inoculated on Sabouraud's dextrose agar with chloramphenicol, and then from positive cultures further speciation was done by morphological examination, Germ tube test, Pseudohyphae, and chlamydospore production by Dalmau's plate culture technique on Cornmeal agar. Isolated Candida species were also subcultured on HiCrome agar for the appearance of different colors produced by individual species. The susceptibility of *Candida* strains against antifungal agents was performed by the disk diffusion method as per the CLSI M44-A2 protocol. 2% glucose and 0.5 µg/ml methylene blue dye (GMB) was used in Muller-Hinton agar medium. [6] Fluconazole 25 µg, Itraconazole 10 µg, Ketoconazole 10 µg, Miconazole 30µg, and Voriconazole 10 µg were tested.

RESULT AND DISCUSSION:

Distribution Of Patients According To Age And Sex In Culture-positive Cases.

Age in years	Total no of cases(N)		Culture positive case			
	No	%	Male	%	Female	%
0-10	4	4.17	2	4.35	2	4
11-20	3	3.13	2	4.35	1	2
21-30	14	14.58	00	0.00	14	28
31-40	13	13.54	5	10.87	8	16
41-50	13	13.54	3	6.52	10	20
51-60	20	20.83	13	28.26	7	14
>60	29	30.21	21	45.65	8	16
Total	96	100.00	46	100	50	100

Distribution Of Candida Species In Clinical Specimens.

Clinical Specimen	Total number of isolates	Percentage
Urine	40	41.67
Sputum	19	19.79
Blood	16	16.67
ET-secretion	6	6.25
BAL-Fluid	5	5.21
Throat swab	5	5.21
Pus	3	3.13
Vaginal swab	2	2.08
Total	96	100.00

BAL-Broncho-alveolar lavage, ET-Endo tracheal.

Distribution of different *Candida* species among various clinical specimens.

Species	C. albicans (N=57), (59.37%)	C. prapsilosis (N=15) (15.62%)	C. krusei (N=15) (15.62%)	C. tropicalis (N=9) (9.37%)	Total (N=96)	
					No	%
Urine	21	6	7	6	40	41.67
Sputum	10	4	4	1	19	19.79
Blood	9	4	1	2	16	16.67
ET-secretion	5	-	1	-	6	6.25
BAL-Fluid	2	1	2		5	5.21
Throat swab	5	-	-	-	5	5.21
Pus	3		-	-	3	3.13
Vaginal swab	2	-	-	-	2	2.08

Antifungal susceptibility patterns of various isolates of *Candida* species.

Antifungal	C. albicans (N = 57)		C. prapsilosis (N=15)		C.krusie (N=15)		C.tropicalis (N=9)		Mean	
	N	%	N	%	N	%	N	%	N	%
FLC	30	52.63	10	66.7	9	60.0	7	77.8	56	58.33
IT	45	78.95	15	100.0	10	66.7	9	100.0	81	84.38
KT	33	57.89	12	80.0	8	53.3	7	77.8	60	62.50
MIC	33	57.89	12	80.0	10	66.7	8	88.9	63	65.63
VRC	30	52.63	11	73.3	09	60.0	7	77.8	57	59.38

Note: FLC-fluconazole, IT-itriconazole, KT-ketoconazole, MIC-

miconazole, VRC-variconazole.

The totals of 96 specimens showing the growth of *Candida* species were isolated from various clinical samples. While studying age and gender distribution, females were slightly more commonly affected as compared to males 46(48%). However, among females, the infection was most common in the 20-30years age group with 14(14.58%) case followed by 10 (20%) case in the 41-50 years age group in comparison to males where 51-60 years age group was most positivity, with 21(45.65%) cases followed by 13(28.26%) cases in 41-50 years age group (Table 1). The highest rate of isolation was from urine 40(41.67%) followed by sputum 19(19.79%), Blood 16(16.67%), and least from vaginal swab 2(2.08%) (Table 2). Table number 3 shows the distribution of four different Candida species among various clinical specimens. The highest prevalent species was *Candida albicans* 57(59.37%), followed by *Candida prapsilosis* and *Candida tropicalis* 15(15.62%). In antifungal susceptibility testing, Itraconazole was the most sensitive drug and Fluconazole was the least sensitive with only 58.33% susceptibility among individual species.

DISCUSSION:

Over the past decade, there has been a significant increase in the number of reports of yeast infections.Infections with these yeast species also have a strong effect on the preference and clinical outcome of empirical antifungal drugs. The potential clinical importance of species-level identification has been recognized as various *Candida* species differ in antifungal susceptibility. [7] In this study, *Candida* species were isolated from various clinical specimens and their antifungal susceptibility patterns were determined. In our study, it was observed that the most common infection associated with candida urinary tract infection and female genital tract infection was the least but a similar study by Alka Nerurkar et al. showed the highest prevalence of respiratory tract infection 75% and also higher infection of female genital infection 20%. [8] A study by L. Sumitra Devi et al. also shows *Candida* species isolates were highest from vaginal swab 20(33.33%). [9] Among the distribution of different species, *Candida albicans* was most common, which was found similar in a study by Shivanand which showed *Candida albicans* (47%), followed by *C. tropicalis* (30%), *C. krusei* (14%), and *C. glabrata* (9%). [10] But other studies observed that non-*albicans Candida* species had predominance over *C. albicans*, which is reliable with the distributed report from various parts of the world. [11-13] *C. tropicalis* was the most common isolate in all samples, followed by *C. albicans*. A relatively greater proportion of *C. tropicalis* isolates in our study is concordant with other studies from India.[14,15] Comparative studies on different *Candida* species in V. Manchanda [16] showed that *C.tropicalis* (55.03%) was higher while it was 9.37% in our study. Another study by Kashid RA et al. [17] showed *C. tropicalis* (46.25%), which was also higher than our study. Though candidiasis can occur at all ages, studies by Dalal PJ and Kelkar SS at Mumbai showed the highest incidence of candidiasis to be in the age group of 21-40 years. [18] These findings were in concurrence with those of our study, where the age group of >60 years was that which had the highest incidence of candidiasis. In our study, the incidence of candidiasis was higher in females as compared to males. The study by N. Pahwa supported the result of the age group, but the male: female ratio was the opposite result. [19] This study reported Itraconazole as the most sensitive but some other studies had different results. All isolated *Candida* spp. were 75% to 100% sensitive for Amphotericin B while non-albicans candida were 75% to 100% sensitive among the Azole group except *C. tropicalis* which 18.7% & *C. albicans* 25.5%. [20] In our study Itraconazole (84.38%) was the most sensitive drug and Fluconazole was the least sensitive with only 58.33% of mean susceptibility among individual species.

CONCLUSION :

From the above study, it can be concluded that the knowledge of *Candida* species distribution and their antifungal sensitivity pattern plays an important role in choosing appropriate antifungal therapy. Our results suggest that candida infections are common in elderly females having UTI. *C. albicans* was the most common species and *C. tropicalis* was the most common among nonalbicans candida. Itraconazole was the most sensitive drug while fluconazole was the least sensitive one.

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