Original Article

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Microbiology Section

Profile of Yeasts Isolated from Urinary Tracts of Catheterized Patients

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ABSTRACT

Purpose: Nosocomial fungal infections are important cause of morbidity and mortality in hospital patients. Urinary catheters have been held responsible to cause a large number of hospital acquired Urinary Tract Infections (UTIs). This study was undertaken to determine the incidence of nosocomial Candiduria associated with in dwelling urinary catheters, to characterize the species and assess their resistance to antifungal agents.

Materials and Methods: Urine specimens from 510 catheterized patients were inoculated on Sabauraud Dextrose Agar; the species identification of *Candida* isolates was done by biochemical tests and antifungal susceptibility testing was done by disc diffusion method.

Results: *Candida* was isolated in 112 (21.96%) specimens. Of these, *Candida albicans* was commonly isolated in 50.89% followed by *C. tropicalis*, *C. glabrata*, *C. krusei*, *C. parapsilosis*, *C. guillermondi* and *C. pseudotropicalis*. Fluconazole resistance was encountered in some isolates. All *C. glabrata* and *C. krusei* were uniformly resistant to fluconazole and 8 of 16 *C. tropicalis* were also resistant to it. But only 7 of 57 isolates of *C. albicans* were resistant to it. Resistance to Nystatin was seen in 34 isolates. Similarly, emergence of resistance was also seen to Ketoconazole and Itraconazole in 24 of 112 isolates. Amphoterecin B resistance was exhibited by 3 *C. albicans*, 2 *C. tropicalis*, 1 *C. glabrata* and 1 *C. krusei strain*. *C. albicans* is an important nosocomial pathogen causing UTI in catheterized patients, nevertheless role of other species of *Candida* as emergent pathogens and resistance to antifungal drugs needs to be emphasized.

Keywords: Yeasts, *Candida*, UTI, *C. albicans*

INTRODUCTION

Candida UTIs are an increasingly prevalent nosocomial problem with uncertain significance [1] *Candiduria*, the presence of *Candida* species in the urine, is in most part associated with the use of urinary catheters [2]. The presence of *Candida* species in urine samples presents the physician with a challenge as to whether the candiduria represents colonization or, lower or upper UTI including ascending pyelonephritis and renal candidiasis with sepsis [3,4].

It is a difficult challenge to manage due to the fact that *Candida* species in the urine can be either completely insignificant or be a marker of a serious entity like renal parenchymal disease with other important clinical possibilities like *Candida* cystitis & fungal balls, that require specific treatment [5]. The surveillance data from the U. S. National Nosocomial surveillance system reported *Candida albicans* to be the fourth most common pathogen in UTI [6].The data in this context from this region is rather fragmentary.

This study was designed to check prospectively the incidence of urinary catheter associated hospital candiduria and to evaluate the microbiological characteristics of the yeasts isolated from patients with indwelling urinary catheters.

MATERIALS AND METHODS

Urine specimens were obtained from 510 catheterized patients, catheterized for at least for 72 hours, admitted in surgical (152), gynaecology (160) and Intensive Care Unit (ICU) (198), on two consecutive days. The second of the two samples was collected after half an hour of change of catheter. The catheter was clamped till the patient senses the urge to urinate or the bladder became palpable. The catheter port was cleaned with 70% alcohol and 10ml urine was collected using a needle and syringe [7].

The informed consent was obtained from the patients. The microscopy of the specimens was done. The specimens showing the presence of pus cells (above 5-7 pus cells/hpf) were included in the study. The specimens were plated on blood agar and Mac Conkey agar for the isolation of bacteria.

The specimens were inoculated on two Sabouraud Dextrose agar slopes, one incubated at 37^{0}C and other at room temperature.

The saline wet mounts were prepared from the growth to confirm that the colonies were of *Candida* species.

Candida isolates which were culture positive on two occasions and negative for bacterial isolates were only subjected to further tests for identification of various species by Germ tube test, sugar fermentation, sugar assimilation and Corn Meal Tween 80 agar cut streak culture [8]. Sugar fermentation test was done using glucose @ sucrose, lactose, maltose, galactose and trehalose [9]. Sugar assimilation was done by auxanographic technique using yeast nitrogen base and various carbohydrate (glucose, galactose, sucrose, maltose, xylose and trehalose) impregnated discs [10]. *Candida albicans* assimilates glucose, galactose, sucrose, maltose. trehalose and xylose. *Candida tropicalis* assimilates glucose, galactose, sucrose, maltose, cellubiose, trehalose and xylose whereas *Candida glabrata* assimilates glucose and trehalose [10]. Chlamydiospore formation was studied by Corn Meal Tween 80 agar cut streak culture [8].

All the strains were tested for antifungal susceptibility testing by disc

Species	No. of isolates (%)
C. albicans	57 (50.89%)
C. tropicalis	16 (14.29%)
C. glabrata	13 (11.61%)
C. krusei	8 (7.14%)
C. parapsilosis	7 (6.25%)
C. guillermondii	7 (6.25%)
C. kefyr	4 (3.57%)
Total	112 (100%)

[Table/Fig-1]: Species distribution of *Candida* isolates

Species (n)	FU (%)	NS (%)	KT (%)	IT (%)	AP (%)
C. albicans (57)	7 (12.28)	20 (35.09)	13 (22.81)	12 (21.05)	3 (5.26)
C. tropicalis (16)	8 (50.0)	6 (37.5)	4(25.0)	5 (31.25)	2 (12.5)
C. glabrata (13)	13 (100.0)	4 (30.77)	3 (23.08)	2 (15.39)	1 (7.69)
C. krusei (8)	8 (100.0)	2 (25.0)	2 (25.0)	3 (37.5)	1 (12.5)
C. parapsilosis (7)	0 (0.00)	0 (0.00)	1 (14.29)	1 (14.29)	0 (0.00)
C. guillermondii (7)	0 (0.00)	1 (14.29)	0 (0.00)	1 (14.29)	0 (0.00)
C. kefyr (4)	0 (0.00)	1 (25.0)	1 (25.0)	0 (0.00)	0 (0.00)
Total (112)	36(32.14)	34(30.36)	24(21.43)	24(21.43)	07(6.25)

[Table/Fig-2]: Resistance pattern of *Candida* to antifungal agents
FU: Fluconazole, NS: Nystatin, KT: Ketoconazole, IT: Itraconazole, AP: Amphoterecin-B

diffusion method using discs (Hi-media) of Amphoterecin-B (20µg), Fluconazole (25µg), Ketoconazole (30µg), Itraconazole (30µg), and Nystatin (50µg). The zone diameters were measured and interpreted as per the standard guidelines [11].

RESULTS

Of the 510 patients, *Candida* species were present in 112 (21.96%) cases. It was present in 64 (28.70) out of 223 female patients and 48 (16.72%) out of 287 male patients. *Candida* species was isolated from 47 out of 198 (23.74%) ICU patients, 38 out of 160 (23.75%) patients of Gynaecology wards and 27 out of 152 (17.76%) surgical patients.

C *albicans* was the commonest species (50.89%). But five other species viz *C. tropicalis*, *C. glabrata*, *C. krusei*, *C. parapsilosis*, *C. guillermondi* and *C. kefyr* were also isolated.

The species distribution of *Candida* is shown in [Table/Fig-1].

The *Candida* isolates showed the resistance to antifungal agents. Their resistance profile is shown in [Table/Fig-2].

DISCUSSION

Candida species isolation from urine cultures alone does not reveal the evidence of infection. The concept of hospital acquired candiduria involves the development of UTI caused by *Candida* species with a culture of > 105 CFU/ml on a specimen collected at least 72 hours after hospital admission and a previous *Candida* species negative culture [12,13]. The presence of *Candida* species was observed in 21.96% urine specimens from patients with urinary catheters. The isolation rates between 11 and 25.7% have been reported from different places [12,14,15]. *C. albicans* was more commonly reported in catheter-associated UTIs than in non-catheter-associated infections [16]. The *Candida* isolations were commonly seen in females as compared to males, which are in accordance to earlier reports [13,17]. The Candiduria was more common and almost at par in patients of Gynaecology wards and ICU as compared to surgical patients. In Gynaecology unit, all the patients were females in whom incidence is more for the reasons too well known [18] while in the other units patients with serious underlying illness with weakened defenses are admitted who as such need prolonged catheterization and hospital stay. The role of species other than *Candida albicans* as emergent pathogens of UTI have been well emphasized [17,19,20]. In the present study *C. albicans* (50.89%) was the most common isolate, followed *C. tropicalis* (14.29%), *C. glabrata* (11.61%) and other species as well. Earlier studies have also reported *C. albicans* to be most common isolate in UTI [21-24]. Although *C. albicans* continues to be the commonest, it must be emphasized that in almost half the cases other species of *Candida* are involved. Similar observations have been reported earlier too [24]. The other species can have more resistance to antifungal agents. The specific identification of *Candida* species may also provide an important help in treatment choice, as *C. krusei* and *C. glabrata* are naturally resistant to fluconazole [25,26].

The sensitivity to *Candida* species to antifungal agents can be tested by a simple disc diffusion technique [27]. Resistant to various antifungal agents have been well documented [27]. In the present study most of the strains were sensitive to Amphoterecin-B, where as varying degree of resistance was seen with other antifungal drugs tested, not only with *C. albicans* species, but also by other species. Fluconazole continues to be quite effective but emergence to resistance to it has been observed in the present study.

The *Candida* species isolated in the present study may be considered as the causative agents due to the isolation of the same strain twice in the paired urine samples in absence of bacterial pathogens and in the light of microscopy of the urine deposit/sediment. The natural history of urinary tract colonization or infection due to *Candida* species in patients with indwelling urinary catheters has not been well defined [17,18]. Catheter removal and efficacy of antifungal drugs to eradicate *Candida* from the urine has been clearly demonstrated [28].

CONCLUSION

The data, in the present study, indicate that surveillance urine cultures for fungi should be carried out in patients with risk factors as they constitute one fifth of quantum of causative agents in such patients. Species identification is also important as about half of them are other than the *albicans* species and are likely to be more resistant. In view of emergence of drug resistance amongst the *Candida* species, antifungal testing by a simple procedure of disc diffusion can be adopted to ascertain the choice of antifungal agents for therapy which are costly.

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