Prevalence of Candiduria and Characterisation of Candida Species in Urinary Tract Infections from a Tertiary Care Hospital

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Abstract

Introduction: *Candida* species are the most prevalent human fungal diseases, according to reports. In recent decades, the incidence of urinary tract infections (UTIs) caused by *Candida* microorganisms has grown. The purpose of this study was to determine the *Candida* species responsible for UTIs in tertiary care hospitals.

Materials and Methods: *Candida* species were detected separately using the germ tube test, colony staining on CHROMagar medium, intracellular beta-glucosidase enzyme activity, and glucose absorption pattern in 2868 urine samples acquired from patients with suspected UTI.

Results: Out of 2868 urine samples, Candida species were isolated in 87 samples. In our study 40.2%, 32.2%, 16.1%, 10.3% and 1.2% of the isolates were identified as *C. albicans, C. tropicalis C. glabrata, C. krusei and, C. Parapsilosis* respectively. Patients between the ages of 21 and 40 were related with the largest number of *Candida* cases, while women were associated with the highest number of *Candida* cases.

Conclusion: *C. albicans* has been identified as the most frequent fungus responsible for urinary tract infections.

Keywords: *Candiduria, Candida species,* UTIs, *Candida albicans.*

Introduction

Urinary tract infection (UTI) is one of the most often diagnosed illnesses in hospitals and in the community [1]. Bacteria and fungi cause urinary tract infections [2]. Some data suggests a decline in the proportion of *E. coli*, Proteus species, and *Pseudomonas* species, and an increase in the proportion of UTIs caused by fungus, *Streptococcus agalactiae*, and *Klebsiella pneumoniae* [2-4]. In recent decades, the frequency of UTIs caused by fungal species, particularly *Candida* species (candiduria), has multiplied by two to three [4,5]. The term candiduria refers to the presence of yeast in the urine, as determined by the detection of budding pseudohyphae under a microscope or by the development of fungi in culture. Urinary candidiasis is the most perplexing kind of candidiasis because

it is difficult to distinguish between colonisation and the actual illness. Candiduria may be indicative of candidemia or invasive renal candidiasis. With invasive urological operations, it may potentially induce candidemia.

The most prevalent yeast, Candida albicans, was identified from individuals with urinary tract infections [6]. Yet, the incidence of candida species other than *Candida albicans* is increasing, indicating a pattern shift. The persistent resistance of *Candida non-albicans* to fluconazole is well documented, necessitating the identification of *Candida* species in patients with UTI prior to initiating an effective treatment [7]. The categorization and identification of yeast in urine is vital for determining the aetiology, as the pathogenicity and antifungal susceptibility pattern vary by species. This study was done to determine the prevalence of *Candida* species in urinary tract infections (UTIs) in a tertiary care hospital.

Materials & Methods

Urine samples from 2868 patients were included in this prospective study, which was carried out in the Department of Microbiology at VIMS Ballary from October 2022 to December 2022. Urine samples were streaked by calibrated loop (0.01 ml) on CLED plates following first direct Gram staining, then incubated at 37°C overnight and read the following day. Any considerable increase in the number of yeast cells on a CLED agar plate with a colony count of greater than 105 CFU/ml and the presence of yeast cells under a direct microscope demonstrate candiduria in the urine. As a detection limit, 100 CFU/ml, which represents a single colony of yeast on a plate, was used. By using serum at 37°C to create germ tubes, several species of Candida were detected. It was possible to distinguish between several types of candida using chrome agar. The investigation eliminated urine samples containing other bacterial growth.

Cled agar, Chrome agar, blood agar, potato dextrose broth, sabouraud dextrose agar, yeast nitrogen base, yeast potato dextrose broth, and cornmeal agar are the primary culture media used in isolating *Candida*. Candida select 4 [8] is another media that may be employed as a selective or differential media. While *C.albicans* and *C.dubliniensis* are closely related species that are challenging to distinguish phenotypically, it has been discovered that growing on Bird seed agar offers a quick, practical, and reliable technique to distinguish these two species [9].

Result

A total of 2868 urine samples were collected during this study period. The Candida species were isolated in only 87 samples. Among the 87 samples, the highest cases were found to be of *C.albicans* (n=35) followed by *C.tropicalis (n=28), C.glabrata* (n=14). *Candida krusei* (n=9) and *C.parapsilosis* (n=1). (Table 1)

**Table 1: The distribution of different Candida species**

Candida species	Number of isolates	Percentage (%)
C.tropicalis	28	32.2
C.grablata	14	16.1
C.albicans	35	40.2
C.krusei	9	10.3
C.parapsilosis	1	1.2
Total	87	100

Young adult patients with age ranging from 21-40 years were associated with highest number of *Candida* cases (Table 2.). *Candida tropicalis* were observed having higher attack rates as the age increases while other *Candida species* were isolated from patients with sexually active age

Table 2: Age wise distribution of *Candida* species

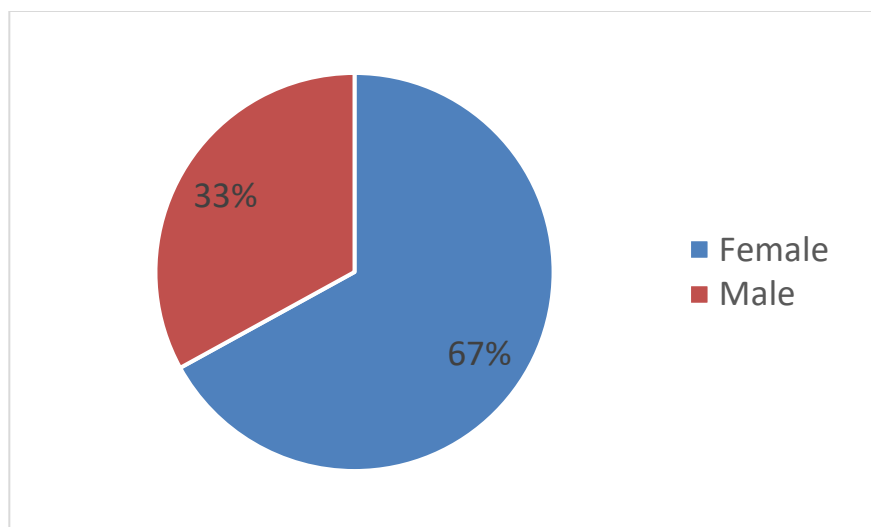| Age	Candida species	
	Number (n)	Percentage (%)
1-20 years	18	21
21-40 years	31	36
41-60 years	22	25
> 60 years	16	18
Total	87	100
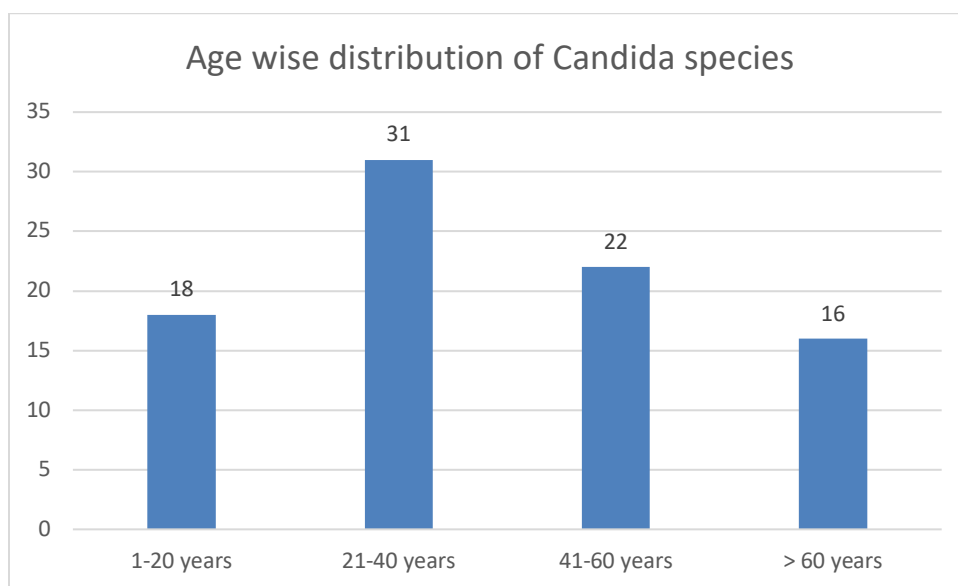
Figure 1: Age wise distribution of Candida

Females were associated with highest number of Candida cases (Table 3)

Table 3: Gender wise distribution of Candida species

Gender	Candida	
	Number (n)	**Percentage (%)**
Female	58	67
Male	29	33
Total	87	100

Figure 2: Gender wise distribution of candida species

Discussion

Worldwide, urinary tract infections are a significant source of morbidity and a significant economic burden [10,11]. Epidemiological information and empiric antibiotic therapy may be used to treat urinary tract infections (particularly in areas with limited human and healthcare resources) [12]. Nevertheless, there is a danger involved in doing this since it may lead to inaccurate local epidemiological data and, more significantly, may prevent the patient from obtaining the proper antibiotic medication [13]. There are certain regular laboratories that don't identify or even grow yeasts from urine samples. The most common isolated species, according to several publications, is *Candida albicans*; nevertheless, there has been a rise in the number of non-albicans *Candida s*pecies (NACS) [13-15]. According to a research by Paul *et al*. [16], we found that females had the largest number of Candida cases. Since Candida species typically colonised the vulvovestibular region, where they might rise upward and produce a urinary tract infection, females are more likely to develop candiduria [17].

In our study, the age group 21–40 years (46%) had the highest prevalence of candiuria, followed by 50–60 years (18%)

and 60–70 years (both 18%). Long hospital stays and intensive care unit stays are thought to increase the frequency of candiduria in patients, according to Nayman Alpat *et al*. [18]

Conclusion

C. albicans species was found to be the most common fungus causing UTI in this study.

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