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Prevalence of Candiduria in a University Campus in Central Nigeria

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ABSTRACT

The term 'candiduria' refers to the presence of Candida species in the urinary system. The presence Candida species in the urine could mean that the patient has pyelonephritis or cystitis. It also could mean that hematogenous seeding of the kidney cortex has occurred in the course of disseminated candidiasis. This study investigated the prevalence of candiduria among students of Nasarawa State University, Keffi, Nigeria. A total of 56 (38.89%) Candida species was isolated out of 144 samples examined. The prevalence among female students was 46 (57.50%), while the males accounted for 10 (15.63%) of the Candida species isolated. C.tropicalis 24 (30%) was predominantly isolated among the female students, while C. utilis 5 (7.8%) and C. albicans 5 (7.8%) was isolated among the male students. The socio-demographic study also indicates that C. tropicalis was the predominant agent of candiduria among students between ages 16 – 20 year-olds (27.5%), 26 – 30 year-olds (20%), ≥ 31 years (22.2%), and married individuals (25%). However, C. albicans was predominantly isolated among the unmarried (14%) and students between ages 21 – 25 years (12.5%). The study recommends constant surveillance in order to checkmate the spread of infectious diseases.

Keywords: *Candiduria, Candida albicans, C. tropicalis, C. utilis*

INTRODUCTION

Candiduria is a general term referring to the presence of *Candida* species in the urinary system. 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 urinary tract infection including ascending pyelonephritis and hematogenous infection, also referred to as renal candidiasis with sepsis [1, 2, 3, and 4].

Studies have shown that *Candida albicans* has been the yeast most commonly isolated from urine, accounting for 50%–70% of isolates [5, 6, and 7]. *Candida glabrata* and *C. tropicalis* are the next most common species found in cultures of urine. *Candida parapsilosisis* found more often in urine from neonates and is usually associated with systemic infection in this population [8].

Although *Candida albicans* is the most common agent for candiduria, non-albicans *Candida* species (NACs) such as *C. glabrata,C. krusei*, C. parapsilosis and C. tropicalis are also important due to increasing resistance to antifungal agents [9,10]. Resistance to fluconazole among NACs is an important problem for clinicians during therapy and prophylaxis [11, 12, and 13].

Although, several fungi such as saprophytic molds are associated with fungalUTIs, *Candida* species are the most prevalent fungal isolates [14]. Candida was the causative pathogen in 27% of all urinary tract infections related to indwelling catheters [15]. The use of catheters is a common portal of entry for microorganisms into the urinary system where they colonize if left in place long enough [7]. Use of antibiotics is a major risk factor for candiduria; it is likely to contribute to colonization by *Candida* species by suppressing endogenous bacterial flora, primarily in the gut and lower genital tract and possibly in the superficial area adjacent to the urethral meatus. It may interfere with phagocyte function and antibody formation with subsequent impaired host defense mechanisms against Candida infection [5, 15, 16,].Managing infections due to *Candida* species has been inconsistent because of paucity of information

on the natural history of candiduria [7, 13, and 17]. This study is therefore aimed at investigating the prevalence of candiduria among students of Nasarawa State University, Keffi, Nigeria.

Materials And Methods

The study area was Nasarawa State University; Keffi in central Nigeria. Keffi is approximately 68km from Abuja, the Federal Capital Territory and 128km from Lafia, the Capital of Nasarawa state. The area is located between latitude $8^{o}5$ N of the equator and longitude $7^{o}8$ E and situated on an altitude of 850m above sea level [18].

Sample Collection

A total of 144 mid-stream urine samples were aseptically obtained from volunteering students who also provided some socio-demographic data (such as, age, gender, marital status, level of education, awareness of Candidiasis/candiduria and type of toilet use) for this survey.

Isolation of Candida species

Candida spp was isolated from urine samples as follow; the urine sample was centrifuged at a speed of 3000 rpm for 5 min after which the supernatant was decanted and the sediment was reconstitute with 1 ml sterile distil water and inoculated unto a plate of sabouraud dextrose agar (SDA) plates and incubated at 37 ^{o}C for 72 h.

Identification of Candida Species

Lactophenol Blue staining

The Candida spp were identified using lacto phenol blue staining method as earlier described by Cheesbrough [19]. Briefly, a drop of lactophenol blue was placed on clean grease-free glass slide and four (4) pure colonies of suspected *Candida* spp were emulsified in a drop of lacto phenol blue in a clean glass slide and covered with cover slide. This was then examined microscopically.

Gram-staining

The Gram staining of the suspected *Candida* spp was carried out as earlier described by Cheesbrough [19]. Briefly, a smear of pure colonies of suspected organism were made on a drop of normal saline placed on a clean grease-free glass slide and allowed to air dry. The slide were passed twice through the flame to heat fix and flooded with crystal violet solution for 30 sec and rinsed under slow running tap water and briefly decolorized with acetone and immediately rinsed under slow running tap water and counter stained with safranin solution for 60 sec and again rinsed under slow running tap water and then allowed to air dry and the slides were examine using x100 oil immersion objective.

Germ Tube Test

Three drops of fresh human serum were dispensed into labeled test tubes. Using a sterile inoculating loop, a colony of yeasts was transferred into the serum in the labeled test tubes. The colony was emulsified in the serum. The set up was incubated at 37 ^{o}C for about 3 h. A drop of the suspension taken from the test tube after incubation was placed on a clean dry slide. The suspension was covered with a clean cover glass. The slide was examined under a microscope for germ tubes on the yeasts. A germ tube is a tube-like outgrowth that arises from the yeast cell.

Results

In the survey of candiduria among students of Nasarawa State University, Keffi, a total of 56 (38.89%) *Candida* species was isolated out of 144 samples examined. The prevalence among female students was 46 (57.50%), while the males accounted for 10 (15.63%) of the *Candida* species isolated (Table 1). *Candidatropicalis* 24 (30%) was the most predominant *Candida* species encountered in this study, found mainly in samples obtained from female students (Figure 1). While *C. utilis* 5 (7.8%) and *C. albicans* 5 (7.8%) was isolated among the male students. The socio-demographic study also indicates that *C. tropicalis* was the predominant agent of candiduria among students between ages 16 – 20 year-olds (27.5%), 26 – 30 year-olds (20%), ≥ 31 years (22.2%), and married individuals (25%). However, *C. albicans* was predominantly isolated among the unmarried (14%) and students between ages 21 – 25 years (12.5%).

Table1. *Prevalence of Candiduria among Students of Nasarawa State University, Keffi*

Gender	No. of Samples	No. of Candida Isolates (%)
Male	64	10 (15.63)
Female	80	46 (57.50)
TOTAL	144	56 (38.89)

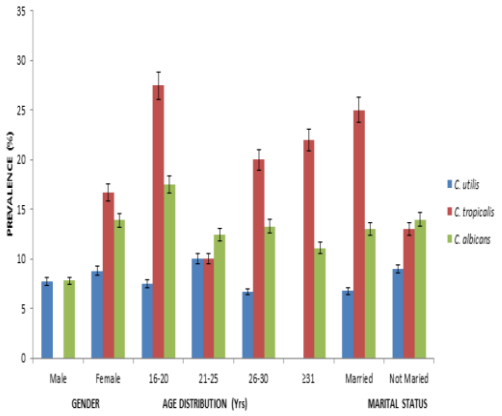

Fig1. *Prevalence of Candida species based Socio-demographic factors among Students of Nasarawa State University, Keffi*

DISCUSSION

Community-acquired Urinary Tract Infections (UTIs) are a frequent problem worldwide which are caused by microbial invasion to different tissues of the urinary tract [20, 21]. *Candida* species are a portion of microbial population that may contribute as fungal uropathogens in UTIs. In recent times, fungal UTIs due to the yeast *Candida* has increased significantly [22, 23]. The prevalence of candiduria among students was not unforeseen because these findings corroborate some recent reports [9, 10, and 24].

The higher prevalence of *Candida tropicalis* which surpasses that of *C. albicans* and *C. utilis* could be due to gender, genetic predisposition, behavioral factors, urologic structural abnormalities, diabetes, immune-suppression, pregnancy, hypertension, stone formation, nosocomial infections and instrumentation like catheterization [24, 25, 26, and 27].

The higher prevalence of Candiduriaamong the female students than the male corroborates the reports of Cunha [28] and Behzadi *et al*. [24] which show that; lower urinary tract infections caused by yeasts is four-times higher in women than in men. Furthermore, the results of different studies including these finding shows that, UTIs in women are very common. It was also observed in this study that the prevalence of urinary *Candida* species such as *C. albicans*, *C. tropicalis* and *C. utilis* among students in relation to marital status was higher among the unmarried than the married.The prevalence of candiduria among students in relation to age shows that the prevalence of *Candida* species higher with increase in age; this could be suggestive on the level of social exposure of the individuals.

CONCLUSION

This investigation reveals 38.89 % prevalence of candiduria among the students of Nasarawa State University, Keffi, Nigeria. The various parameters investigated in this survey indicates that C. tropicalis was the most frequently isolated agent of candiduria, followed by *C.* albicans and C. utilis respectively. The prevalence in the female students is four-times higher than in the males.

Reliable diagnosis that distinguishes colonization from infection has not been fully established. However, there is an increasing need for education of individuals on the risk factors associated with candiduria and the need to seek medical intervention in the appropriate time.

Conflict of Interest

The authors declare that there is no conflict of interest. Ethics approval this research was conducted following approval from the Nasarawa State Ministry of Health.

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