PREVALENCE OF *CANDIDA* SPECIES RESPONSIBLE FOR URINARY TRACT INFECTIONS AMONG IN-PATIENTS IN MURTALA MUHAMMAD SPECIALIST HOSPITAL, KANO, NIGERIA

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Background: The presence of yeast in the urine has been associated to an increased risk of death, particularly in patients in intensive care units. Urinary tract infection is one of significant public health problem that is being faced by billions of people annually and may be a cause of morbidity and a significant economic burden globally. Candiduria may be a sign of a significant underlying health condition.
Aim: Our aim is to determine the prevalence of UTIs among in-patients in Murtala Muhammad Specialist Hospital, Kano using a cross-sectional study.
Materials and Methods: A total of 150 in-patients suspected of having urinary tract infections were recruited. Questionnaires were administered and urine sample were also collections from the participants. The urine samples were cultured on Blood agar and SDA to obtained yeast isolates. The isolates were identified using germ tube test and API as biochemical analysis for confirmation.
Results: The results revealed a prevalence of 8.0% for Candida species in the samples collected. *Candida albicans*, *C. famata*, *C. glabrata* and *C. tropicalis* were the predominant *Candida* spp isolated from the urine samples collected from the patients. The study showed the higher prevalence of *Candida* isolates among females compared to males. Candidal growth was commonly seen in patients with prolong used of antibiotics, longer stay in hospital and surgery operation.
Conclusion: There is need for an intervention to shorten time spent at the hospital to prevent risks of contracting health care acquired infections.
Key words: Urine Candida, Urinary Tract Infections, Murtala Muhammad Specialists Hospital, Kano.

INTRODUCTION

Urinary tract infection (UTI) has been mentioned from ancient times with the first documented description in the Ebers Papyrus dating to 1550BC (Acar *et al.,* 2009). Effective therapy did not occur until the development and availability of antibiotics in the 1930s (Adrich *et al.,* 2005). Urinary tract infections are the problems that are being faced by billions of people every year. It most commonly manifests as urethritis, but it can also spread to the bladder, ureters, and kidneys, causing cystitis and pyelonephritis (Turpin *et al.,* 2007).

Candida species produce the majority of fungal infections of the urinary system, which frequently appear as difficult nosocomial infection. Rarely does one find candiduria as a community-acquired infection in a structurally normal urinary tract, *Candida* species account for about 10-15% of nosocomial UTIs (Lundstrom and Sobel, 2001). Some patients with candiduria were symptomatic, exhibiting one or more symptoms such as fever, vulvar pruritus, dysuria, and severe burning while urinating (Turpin *et al.,* 2007).

Subira *et al.* (2018) conducted a study in Kenya to determine the prevalence, species distribution, antifungal susceptibility profiles of *Candida* and risk factors associated with *Candida* isolation in patient samples. The results showed the prevalence of *Candida* species isolation as 8.6% with *C. albicans* being the most common specie (7.8%), followed by *C. tropicalis* (0.8%). In a study conducted to investigate the prevalence of candiduria among students of Nassarawa State University, Keffi, Nigeria (Tsaku *et al.,* 2019), and a total of 56 (38.89%) *Candida* species was isolated out of 144 samples examined. The prevalence was higher in female students 46 (57.50%), compared to the males, 10 (15.63%). *Candida tropicalis* 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 (Tsaku *et al.,* 2019).

Fungal diseases kill approximately 1.5 million people worldwide each year and affect over 1 billion people (Bongomin and Denning, 2017) and 11.8% of the Nigerian population is estimated to suffer from serious fungal infections each year (Oladele and Denning, 2014). The clinical dilemma with fungal infection of the urinary tract is to distinguish between colonisation and infection (Bukhary, 2008). Extremes of age, female sex, immunosuppressive drugs, intraurethral catheters, and disruption of urine flow, radiation therapy, genitourinary TB, intensive care unit stay (ICU), wide spectrum antibiotic therapy, and diabetes mellitus are all risk factors for candiduria (Sobel, 2002; Srirangraj *et al.,* 2015). Candiduria was previously uncommon and largely ignored but because of the use of invasive devices, immune suppressive therapy, and long-term use of broad-spectrum antimicrobial drugs, *Candida* species have become an increasingly major source of infections in people (Kauffman, 2014; Oubayyou *et al.,* 2016).

MATERIALS AND METHODS

Study Area

This study was conducted at Murtala Muhammad Specialist Hospital (MMSH) in Municipal Local Government Area of Kano State, located at latitude 10° 33N to 11°15N and longitude 34°E to 8° 2'E (National Population Commission, 2006). The hospital is strategically located for access to both urban and rural population from the 44 Local Governments Areas of Kano State.

Study Design and Sample Size Determination

The study was a hospital based cross-sectional study and it was conducted at Murtala Muhammad Specialist Hospital Kano. The sample size for the study was determined from a standard epidemiology formula for minimum sample size calculation (Nwabuisi and Onile, 2001). Using prevalence of 9.5% from a previous study conducted in Murtala Muhammad Specialist Hospital, Kano (Muhammad and Muhammad, 2019), 95% Confidence level, a desired level of precision of 0.05 and an increase of 10% to account for attrition, a sample size of 150 was obtained. The formula is;

$$n = \frac{(Z1-a)^2(P)(1-P)}{d^2}$$

Where; n = minimum sample size
Z1-α = value at which 95% confidence interval was found (1.96)
p = prevalence obtained from previous study (9.5%)
d = error rate

Study Population

A total of 150 hospitalised patients with suspected urinary tract infection and quantitative culture with a colony count of $\geq 10^4$ colony-forming unit (CFU)/ml of urine in patients without an indwelling urinary catheter and $\geq 10^3$ CFU/ml of urine in patients with indwelling urinary catheter were considered significant.

Ethical Clearance

Ethical approval was obtained from the health research and ethics committee of the Kano State Ministry of Health (Reference No. MOH/OFF/797/T.I/1991).

Informed consents were sought and signed by patients from whom the urine samples were collected. Data were collected from patients using an interviewer administered structured questionnaire, physical examination findings, and clinical diagnoses were also noted.

Sample collection

The urine specimens consisting of midstream and catheter samples were collected in a wide-mouthed, sterile leak-proof screw cap container (Colee *et al.*, 1996). The midstream urine samples were collected after cleansing the periurethral and perineal areas with gauze pads soaked in soapy water, the labia were held apart during voiding in females (Gary *et al.,* 2017). For the catheter urine samples, a sterile syringe and needle was connected through a soft rubber connector between the catheter and collecting tubing to aspirate the sample, urine samples were not collected from the catheter bag (Wasington *et al.,* 2000).

Culture

An inoculating wire loop calibrated to hold 0.01ml of urine was sterilised in a Bunsen flame. The loopful of urine sediment was cultured on the Sabouraud Dextrose Agar (amended with chloramphenicol and gentamicin) and Blood Agar. All inoculated SDA and Blood Agar plate were incubated at 37°C for 24-48hrs and then read. Colonies that were cream-coloured, pasty and smooth were collected for gram staining (Badiee *et al*., 2010).

Identification of Yeast Isolates

Germ tube test

Using a sterile inoculating loop, a colony of suspected yeasts was transferred into the serum in the test tubes. The colony was emulsified in the serum. The mixture was incubated at 37° for about 3 hours. Using a Pasteur pipette, 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 and examined under the microscope for germ tubes on the yeasts using the 10X and 40X objective lenses (Chander, 2009; Wasington *et al*., 2007 and Colee *et al.*, 1996).

Analytical profile index (API 20CAUX) (BioMereux)

Analytical profile index Auxillary (API 20 CAUX) test for the precise identification of the encountered yeasts was carried out according to manufacturer's instructions. Incubation at 29°C for 72hours as directed by the manufacturer was done, after incubation growth in each cupule was compared with the control. A cupule with more turbidity than the control was recorded as a positive reaction. A numerical profile was generated based on the reactions seen and entered manually on the website (www.apiweb.com) to obtain the yeasts species with codes that correspond to acceptable identification.

Data Analysis

Data obtained were compiled in Microsoft excel and analysed using SPSS version 22.0. Associations of variables were assessed using chi square value of $p \leq 0.05$ was set as an indicator of statistical significance.

RESULTS

Out of the 150 patients recruited for the study, 81 (54%) were males and 69 (49%) were females, both within the age range of 10-90years. A total of 116 mid-stream and 34 catheter urine samples were collected from the patients as shown in Table 1.

A total of 12 samples yielded the growth of *Candida* species from the 150 samples collected in this study, resulting in an 8.0 % prevalence of *Candida* in the urine samples collected from in-patients in Murtala Muhammad Specialist Hospital. Our study also revealed that *C. albicans* is the most common isolated *Candida* spp. Other *Candida* species that were isolated are *C. famata, C. tropicalis, C. famata, C. glabara* and *C. parapsilosis* as shown on Table 2.

Table 3 shows the association between risk factors seen in the patients and *Candida* spp isolated.

Though no statistical significance was observed, *Candida* spp was isolated more in patients with prolong used of antibiotics (10/12), longer stay in hospital (9/12) and surgery operation (9/12) compared to those without these risk factors. Lower abdominal pain, dysuria and increase urination frequency were the predominant clinical symptoms observed in the patients. These were the most common clinical symptoms in males as shown in Figure 1 while incontinence and urine retention were common among the females.

Table 1: Distribution of patients urine samples collected according to sex

Urine Samples	Females	Males	Total
Catheterised	11	23	34
Midstream	58	58	116
Total	**69**	**81**	**150**

Table 2: Distribution of *Candida* species isolated from the urine samples

Candida species	Catheterised	Mid-stream	Total
C. albicans	3	1	4
C. famata	3	0	3
C. glabrata	0	2	2
C. tropicalis	0	2	2
C. parapsilosis	1	0	1
Total	**7**	**5**	**12**

Table 3: Risk factors associated with isolation of *Candida*

Variables	Isolation of *Candida*		Total	χ^2/Fisher Exact	p-value
	Positive	Negative			
Prolong use of antibiotics					
Yes	10 (7.2)	128 (92.8)	138 (92.0)	1.743	0.280
No	2 (18.2)	9 (81.8)	11 (7.3)		
Diabetes					
Yes	6 (11.1)	48 (88.9)	54 (36.0)	1.110	0.352
No	6 (6.3)	90 (93.8)	96 (64.0)		
Immunosuppressive					
Yes	3 (8.8)	31 (91.2)	34 (22.7)	0.041	0.735
No	9 (7.8)	107 (92.2)	116 (77.3)		
Surgery					
Yes	9 (9.7)	84 (90.3)	93 (62.0)	0.936	0.261
No	3 (5.3)	54 (94.7)	57 (38.0)		
Catheterisation					
Yes	7 (7.7)	84 (92.3)	91 (60.7)	0.030	1.000
No	5 (8.5)	54 (91.5)	59 (39.3)		
Length of hospital stay					
<30 days	9 (7.0)	119 (93.0)	128(85.3)	1.113	0.386
>30 days	3 (13.6)	19 (86.4)	22 (14.7)		

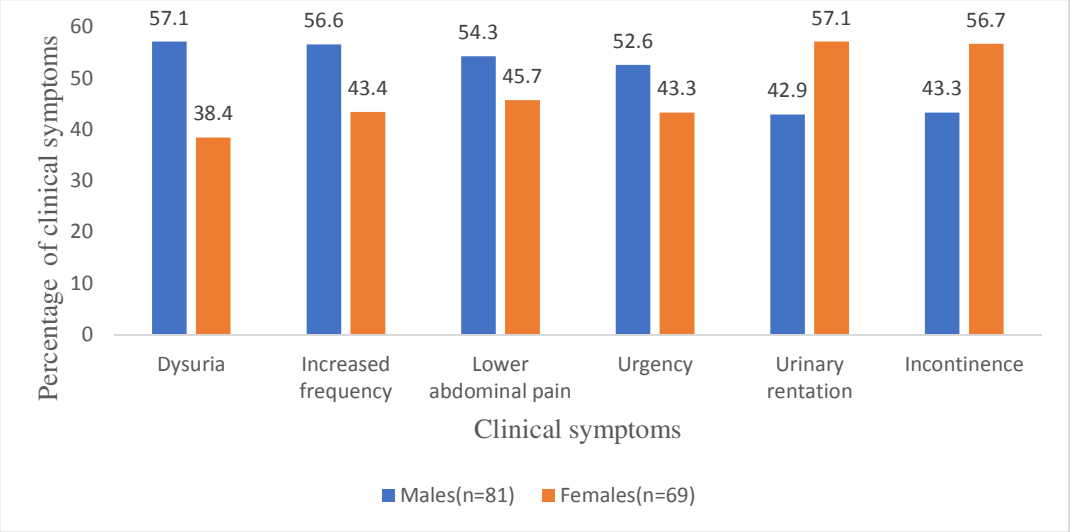

Figure 1: Distribution of clinical symptoms presented by the patients

DISCUSSION

This study showed a lower prevalence of *Candida* spp (8.0%) isolated from both catheterised and mid-stream urine samples in the hospitalised patients compared with the study conducted in Brazil by Passos *et al.* (2005) which reported a prevalence of 44%.

This study showed the higher prevalence of *Candida* isolated among females (8/12) compared to males (4/12). This finding is similar to a study reported that patients who presented with Candiduria were more common in females and pregnant (Ahckar and Fries, 2010; Tsaku *et al.,* 2019).

Though no statistical significance was observed, *Candida* spp was isolated more in patients with prolong used of antibiotics (10/12), longer stay in hospital (9/12) and surgery operation (9/12) compared to those without these risk factors. However, receiving immunosuppressive therapy (3/12), diabetes (6/12) and catheterisation (7/12) were found to be not significant in frequency for those with *Candida* isolation, despite reports by other researchers incriminating other risk factors. This study could be compared with the study of Sobel (2002) which discovered several risk factors, including the use of indwelling urinary devices, diabetes, antibiotic use, immunosuppressive therapy, extreme ages, and female sex as being linked to a rise in *Candida* development in the urine.

Our study also tried to compare underlying diseases as a reason for having the urinary candidiasis, where we observed that those patients with chronic kidney diseases yielded more of the *Candida* isolates compared to those with acute pyelonephritis, though no statistical significance was observed either.

CONCLUSION

The prevalence of *Candida* in urine samples collected from the patients with clinical symptoms of urinary infection at the Murtala Muhammad Specialist Hospital is 8.0%. *Candida albicans* and *C. famata* were predominant *Candida* spp isolated from the catheterised urine samples, while *C. glabrata* and *C. tropicalis* were the predominant *Candida* spp isolated from the midstream urine samples.

Prolong hospital stay which often leads to frequent usage of antibiotics, as well as underlying chronic illnesses (example renal disease) predisposes a patient to all sort of health care acquired infections which can also be in the form of *Candida* urinary colonisation or infections.

Recommendations

There is a need for interventions from governments and health policy makers to improve accessibility and quality healthcare delivery system that shortens the time spent at the hospitals as it leads to health care associated infections.

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