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AN OBSERVATIONAL STUDY OF IDENTIFICATION OF CANDIDA SPECIES IN VARIOUS CLINICAL SAMPLES & THEIR ANTIFUNGAL SUSCEPTIBILITY PATTERN IN SMS HOSPITAL, JAIPUR

Clinical Microbiology

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ABSTRACT

Introduction: Candida is the most important fungal opportunistic pathogen, though it is a normal commensal flora then also it can cause infections in the immunocompromised hosts. As non-albicans Candida have replaced Candida albicans as the predominant pathogen which is more life-threatening, more resistant to antifungal drugs so speciation of Candida is important. **Objective:** To identify & speciate Candida isolates from various clinical samples and to find out their antifungal susceptibility pattern. **Material and method:** Samples were screened for budding yeast cells with the help of Gram stain & KOH mount and then inoculated on SDA with gentamycin and chloramphenicol. For speciation, Germ tube testing was done followed by CHROM agar and chlamydospores on Cornmeal agar. **Results:** Out of 100 Candida isolates, 19 were Candida albicans and 81 were non-albicans Candida. Among four antifungals tested, Amphotericin B showed the best efficacy with 83% strains sensitive to it and fluconazole showed the least efficacy with 47% strains resistant to it. **Conclusion:** Though Candida albicans and non-albicans Candida are closely related but differ from each other with respect to epidemiology, virulence factors, and antifungal susceptibility. As non-albicans Candida is more life-threatening and more resistant to antifungal agents; speciation of Candida becomes mandatory so that mortality and morbidity of the patients can be overcome.

KEYWORDS

To speciate and to detect antifungal susceptibility of Candida isolates.

INTRODUCTION

The main emerging agents for nosocomial infections are bacteria but fungi are also no less [1] According to the Surveillance & Control of pathogens of Epidemiologic Importance (SCOPE) program; Staphylococcal species was the most common causative agent of septicemia which was followed by Candida. According to 180 United States Hospitals, which participated in the National Nosocomial Infections Surveillance (NNIS) system between January 1980 and April 1990; Candida species accounted for 19621 (72.1%) out of 27200 fungal isolates.[2] Patients admitted in Intensive Care Units in tertiary care hospitals have access to very intensive management modalities. This along with the increasing number of immunocompromised patients and indiscriminate use of azole antifungal group of drugs have led to a rise in infections caused by Candida, especially non-albicans Candida.[3] Major non-albicans Candida species are Candida tropicalis, Candida krusei, Candida glabrata, Candida parapsilosis.[4]

Common symptoms of candidiasis are paronychia, onychomycosis, oesophageal candidiasis, respiratory infections, vulvovaginitis, thrush, endocarditis, fungemia, candidemia, or disseminated infections [5]. Vulvovaginal candidiasis (VVC) is frequently seen in women, some women suffer from recurrent episodes of this infection, which is called recurrent vulvovaginal candidiasis (RVCC).[6]

Apart from the indiscriminate use of drugs, the other cause of antifungal resistance is that Candida form complex intracellular networks called biofilms .[7] which is formed on synthetic materials of indwelling medical devices of admitted patients like urinary catheters, endotracheal tubes, wound drains, etc. and thus help other organisms to adhere to devices and render them more resistant towards antifungal drugs.[8] Moreover drug-resistance is a major cause of treatment failure in these patients. Resistance to azoles becoming increasingly important in some patients.[9] So to overcome this resistance, other alternative drugs which are more effective and more promising and have better antifungal effects at low drug concentrations; have to be developed.[10]

MATERIALS & METHODS

The present study was conducted over a period for one year (January 2020 to December 2020) in the Department of Microbiology, SMS Medical College & Hospital, Jaipur (Rajasthan). The clinical isolates recovered from both outpatients and inpatients and were identified by using standard microbiological protocols.

Total 198 clinical specimens were processed. Clinical specimens like blood, nasal swab, tracheal swab, tracheal aspirate, urine, sputum, pleural fluid, skin scrapings were included in the study.

Preparation of samples

Samples were screened for budding yeast-like cells with the help of Gram stain and KOH mount, and then inoculated on Sabouraud's Dextrose Agar with Gentamycin 5g/ml, Chloramphenicol 16g/ml and for skin scrapping Gentamycin 5g/ml, Chloramphenicol 16g/ml and Cycloheximide 500g/ml at 25°C and 37°C for 24 to 48 hours. For speciation, Germ tube test[2][5][11] was done followed by CHROM agar[12] and formation of Chlamydospores on Cornmeal agar[2][5][13].

RESULTS

This study was conducted in SMS Medical College, Jaipur, from January 2020 to December 2020. Permission from the institutional ethical committee was obtained. Out of 100 samples, 65 were obtained from males and 35 from females. Out of 100, 11 were neonates, 5 were infants, 12 were between the age of 1 to 10 years, 60 were between the age of 11 to 60 years, 11 were between the age of 61 to 70 years and 1 patient was above 70 years.

Out of 100 patients maximum of 45 had UTI and a minimum 1 had chest pain.

Table No. 1: Predisposing factors for Candida infections.

Predisposing factors	Number of patients	Percentage
Urinary tract infection	45	45%
Pyrexia	16	16%
Sepsis	13	13%
TB with Upper respiratory tract infection	13	13%
Tb with Lower respiratory tract infection	5	5%
Acute upper respiratory tract infection	4	4%
Dermatitis	3	3%
Chest pain	1	1%
Total	100	100%

Out of 100 samples, maximum of 53 were urine samples and a minimum 2 were nasal swabs.

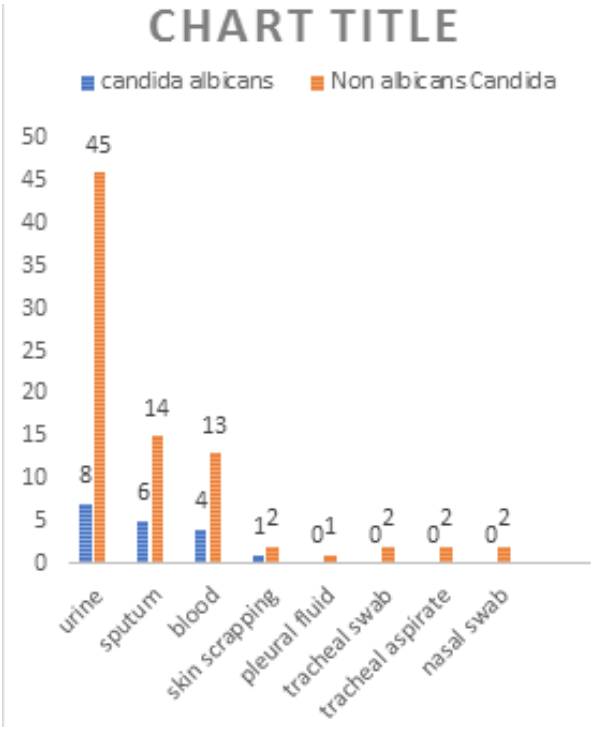

Fig. 1. Candida isolates from various samples

Out of 100 isolates, 19 were Candida albicans and 81 were non-albicans Candida.

Table No. 2- Different species of Candida isolates.

Candida species	Number	Percentage
Candida albicans	19	19%
Candida tropicalis	39	39%
Candida krusei	17	17%
Candida glabrata	14	14%
Candida parapsilosis	11	11%
Total	100	100%

Maximum 83% strains were susceptible to Amphotericin B And 53% strains were susceptible to fluconazole.

Table No. 3: Different antifungal susceptibility of Candida species.

	Candida albicans		*Candida tropicalis*		*Candida krusei*		*Candida glabrata*		*Candida parapsilosis*	
Total number of isolates	(19)		(39)		(17)		(14)		(11)	
Pattern S=Sensitive R=Resistant	S	R	S	R	S	R	S	R	S	R
Fluconazole	7 (36.8%)	12 (63.1%)	33 (84.6%)	6 (15.3%)	0 (0%)	17 (100%)	6 (42.8%)	8 (57.1%)	7 (63.6%)	4 (36.3%)
Voriconazole	13 (68.4%)	6 (31.5%)	21 (53.8%)	18 (46.1%)	14 (83.3%)	3 (17.6%)	9 (64.2%)	5 (35.7%)	8 (72.7%)	3 (27.2%)
Amphotericin B	16 (84.2%)	3 (15.7%)	33 (84.6%)	6 (15.3%)	15 (88.2%)	2 (11.7%)	11 (78.5%)	3 (21.4%)	8 (72.7%)	3 (27.2%)

DISCUSSION

As in this study more samples were obtained from males than females with the ratio of 1.8:1 which correlates with the study done by Ashish Gupta et al[14] , with the male-female ratio being 1.8:1. Most of the patients belonged to 41 to 50 years of age , however according to the study done by Emeribe et al[15] and Puri et al[16] most of the patients belonged to the age group 21-40 years. 45% of patients were suffering from Urinary tract infection, 16% ofpatients had pyrexia, rest of patients had another histories. However, study done by Xess et al[17] stated that prolonged antibiotics use (71.2%) and urinary catheters (56.5%) were the main risk factors in their study and Saldanha Dominic RM et al[18] found that Diabetes Mellitus (32%) and urinary catheters (12%) were major risk factors in their study.

Maximum Candida isolates were obtained from urine which were 53%, which was followed by sputum and blood; 20% and 17% which is almost in accordance with the study done by Munmum B Marak et al[19] which showed max recovery of isolates from urine samples (43%). Total of 100 isolates of Candida were studied in this study (64.1% cases) as which correlates with the study done by S Vishal et al[20] showed 69.02% prevalence. Candida tropicalis 39% was the predominant isolate followed by Candida kruesi 17% which were further followed by Candida glabrata 14% and Candida parapsilosis 11% which is almost similar to the study done by Gunjan Shrivastava et al [21] who reported Candida albicans 14.5% ,Candida tropicalis 42% and Candida krusei 38% and Dr. Madhu Sharma G et al[22]who reported Candida albicans 25%, Candida tropicalis 35.7%, Candida glabrata 17.8%, Candida parapsilosis 16%.

Antifungal susceptibility of Candida species showed the highest resistance to Fluconazole followed by Voriconazole and Amphotericin B. Overall 47% of strains were resistant to fluconazole, which was higher than the study done by Gupta et al [23] and Kothari et al[24] which showed resistance level of 37.5% and 36% respectively, and was lower than the study done by Chung-fang Ma et al[25] which showed resistance level of 53.9%. Overall 35% strains were resistant to Voriconazole, Khan M et al[26]reported 15% resistance among Candida species, Whereas Kumar et al P[27] reported no resistance for Voriconazole. Our study had higher resistance to voriconazole compared to these studies; might be because of prolonged use of this drug among patients. Overall 17% of strains were resistant to Amphotericin B, however in the study done by Jaswinder K Oberoi et al [28]; 10.4% resistance was reported for amphotericin B and M Bhatt et al [29]8% resistance was reported.

CONCLUSION

Candidiasis refers to the infection caused by any of the species of Candida. The incidence of Candida is increasing worldwide. It is one of the most common species causing opportunistic fungal infection which causes mainly superficial infections but can also cause tissue invasion & life threatening conditions.

Though Candida albicans & non-albicans Candida are closely related but differ from each other with respect to epidemiology, virulence characteristics & antifungal susceptibility. As non-albicans Candida have replaced Candida albicans as the predominant pathogen which are more life-threatening and more resistant to antifungal drugs, speciation and early detection of Candida infection becomes mandatory, so that morbidity and mortality of the patients can be overcome. This study was conducted in the Department of Microbiology & Immunology SMS Medical College and Hospitals, Jaipur (Rajasthan) from July 2019 to July 2020. The main purpose of this study was to find out the prevalence of different Candida isolates from various clinical samples.

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