ORIGINAL RESEARCH PAPER | Medical Science | Volume : 6 | Issue : 8 | August 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Rescent Trends of Candida Infection and There Susceptibility Test

KEYWORDS: Antifungal agents, Candidiasis, Medical mycology, Opportunistic infection, Susceptibility testing.

Priya Shukla	Brij Nandan Singh	Mo. Gufran Khan
Research Investigator, Department of Microbiology, The Doctor's X-Ray and Pathology Center Pvt. Ltd., Kanpur	Junior Resident, Department of Microbiology, G.S.V.M. Medical College, Kanpur (UP.).	Research Investigator, Department of Microbiology, The Doctor's X-Ray and Pathology Center Pvt. Ltd., Kanpur

ABSTRACT **Introduction**-*With the increase in the number of immunocompromised individuals, there has been a consequent rise in the number of opportunistic infections and Candida spp have especially emerged as important pathogen in the group of patients. Further the rise in antifungal resistance is an important concern.*

Methodology- *Duration of the study was from 2011-2015. Candida species were isolated from various clinical specimens and were subjected to speciation and antifungal susceptibility testing by the VITEK–2 System (Biomerieux, france). The antifungal agents tested were Voriconazole, Fluconazole, Itraconazole, Capsofungin, Amphotericin-B and Flucytosine.*

Results- *A total of 270 Candida spp isolated from various clinical specimens were included in the study. Candida spp. were mainly isolated from urine 107(39%) followed by sputum 51(18%), Endotracheal aspirates 28(10%),Blood culture 26(9%) and Centre line tip 22(8%) etc. The most common spp. was Candida albicans (38%), the non-albicans Candida species form the remaining 61% of the total isolates, thus stressing their emergence as major fungal pathogens amongst them most common isolate were Candida tropicalis (30%) susceptibility pattern showed that Candida albicans were highly sensitive to Amphotericin- B (78%) followed by Fluconazole (77%) and flucytosine (77%), Itraconazole (68%) and Voriconazole (68%) Candida tropicalis were also highly sensitive to Amphotericin–B (87%) followed by Fluconazole(80%) and Flucytosine (91%), Itraconazole(63%) and Voriconazole(83%).*

Conclusion- *Correct and rapid Speciation of Candida spp.is important because of variation in antifungal susceptibility of various species to different antifungals and also due to limited therapeutic option because of emergence of resistance to antifungal agents.*

INTRODUCTION

In today's world with remarkable modern advances in medicine, there has been an increase in the number of immunocompromised individuals who need extensive care in hospitals especially those due to *Candida species*. This has resulted in arise in the incidence of fungal infections, They are important nosocomial pathogens in critically ill. Patients are associated with substantial mortality and prolonged hospitalization in the intensive care unit[1,2].*Candida spp.* causes diseases ranging from superficial infections to invasive disease, yet they show differences in disease severity and susceptibility to different antifungal agent[3]. due to variable clinical presentation of *Candida* infection. It becomes very important to identify this kind of pathogens from all the clinical specimens received at laboratory irrespective of clinician's suspicion. *Candida species* differ in their antifungal and virulence factors [4,5]. For example-*Candida krusei* and *Candida glabrata* are known to their innate resistance to Fluconazole [4.]Thus identification of *Candida* up to species level along with antifungal susceptibility becomes very essential. Speciation helps to understand the epidemiology of *Candida spp*. particularly the source and mode of transmission. This in turn facilitates the development of effective measures to prevent and control the transmission of resistant pathogenic infection [3]. The aim of the study to know the incidence of various species of candida from suspected candida infection and there antifungal susceptibility pattern.

MATERIALAND METHODS

This study was conducted in the Department of Microbiology,The Doctor's X-Ray and Pathology Institute Pvt. Ltd,Civil lines, Kanpur. A total of 270 *Candida* isolates from various clinical specimens.(Endotracheal aspirates, central linetip, throat swab, high vaginal swab, pus, Broncho Alveolar Lavage , blood culture Cerebrospinal fluid and other body fluid) were included in the study collected from 2011-2015. The various clinical samples were collected and processed as per the standard microbiological procedures. The specimen were inoculated on the C.P.S media [4], (BioMerieux, france), Sheep blood agar (BioMerieux, france) and Sabouraud dextrose agar (Himedia, Bombay) using sterile loop. The isolate identification and antifungal susceptibility testing was done using Vitek-2 (BioMerieux,france). The antifungal agents tested were Voriconazole, Fluconazole, Itraconazole, Amphotericin-B and Flucytosine.

RESULTS

A total of 270 samples showing growth of *Candida* were included in the study. *Candida* was most commonly isolated from urine 107 (39%) Other sources included sputum 51 (18%) Endotracheal aspirates 28 (10%),central line tip 22 (8%)(Table :1)

Candidiasis was most common in the age group of 21-40 years (25.2%),followed by 41-60 years (24.4%), 61-80 (22.2%),81-100 (9.2%) and 0-20 (18.8%) The rate of isolation of the *Candida spp.* was more in males (39.62%) than in females (60.37%).

Volume : 6 | Issue : 8 | August 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

On speciation it was seen that *Candida albicans* was the most frequent isolate 105(38%), followed by *Candida tropicalis* 82(30%), *Candida glabrata* 26(9%),*Candida sake* 16(6%), *Candida krusei* 9(3%) were the other common species isolated. All isolated *Candida spp.* were 50%-100% sensitive among the Amphotericin-B, Voriconazole, Fluconazole, Itraconazole & flucytosine except *Candida intermedia* were highly resistant 66% from all drugs; *Candida dubliniensis* were sensitive to 20% to Flucytosine.

DISCUSSION

A significant increase in the prevalence of fungal infections, especially those due to *Candida spp*.is being seen in recent times. This is predominantly due to rising numbers of immunosuppressed patients, wide-spread use of broad spectrum antibiotics, steroids, intensive cancer therapy, invasive medical devices, organ transplantation, human immunodeficiency virus (HIV) disease epidemic and an expanding aging population. *Candida spp.* are seventh most common cause of nosocomial pathogens world wide and due to thewell recognized importance of these agents as nosocomial and opportunistic fungal pathogens, it is important to study epidemiological and antifungal susceptibility pattern of *Candida spp.*

A total of 270 *Candida strains* were taken in the maximum isolates were from urine (39%) followed by sputum (18%) and Endotracheal aspirates (10%).The present study had a male preponderance among patients, with an overall female:male ratio being 2:1. In a similarstudy by Kandhariet al., they reported Male:female ratio is 1:2 However our findings are contradictory to those of Patel et al.,from Ahmedabad a male preponderance, with and over all Male : female ratio is 1:2.

Inthis studyCandidal infection was highest in the age group of 20-40years.Though Candidiasis can occur at all ages, studies by Dalaletal., from Mumbai also showed the highest incidence of Candidiasis to be in the age group of 21-40 years.

The speciation of *Candida* is important to study the epidemiology and trends of *Candida* infections in a given set- up. This information is also essential for choosing the antifungal agents, because of variation in the sensitivity of different species to various antifungal agents. For examplethe azoles group of drugs are effective against *Candida albicans* and *Candida tropicalis* however *Candida krusei* and *Candida glabrata*[8,9] are intrinsically resistant to them. Various Studies over the years have shows that there is a considerable increase in the *non-albicans Candida spp*.isolates. In the present study it was also observed that *non-Candida albicans*(61%) are more frequently isolated than *Candida Albicans (39%).* In a similar study by Ananth. R et al.,[10] It has been documented that incidence of *non albicans Candida spp.* (70%) to be higher than that of *Candida albicans* (30%).Similar finding have been reported by several other studies[5,11]. In vitro susceptibility testing of antifungal agents is becoming increasingly important because of the introduction of new antifungal agents and the recovery of clinical isolates.

Antifungal susceptibility testing was done on all 270 *Candida* isolates by Vitek-2 system (BioMerieux, France).The *Candida tropicalis* were 80-83% sensitive to Voriconazole and Fluconazole.The *Candida glabrata* were (80.7%)sensitive to Voriconazole and 53.8% sensitive to Fluconazole. It was interesting to observe that the resistance to Fluconazole among *Candida albicans* and *non-albicans Candida* was 31% and 23% respectively. Amphotericin-B resistance among *Candida albicans* and *non-albicans Candida* was 32% and 20% sensitive respectively. It was seen that *Candida globsa*, *Candida famata*, *Candida rugosa* & *Candida guilliermondii* were sensitive to 100% from all drugs.

The findingof the present study correlated with those of study done by Vijaya D et al.,from Karnataka which showed *Candida albicans* and *non-Candida albicans* have 100% sensitivity to Amphotericin-B while Azole group of drugs were used in second choice.

However significant resistance of fluconazole was observed for *Candida albicans* (24%) Our findings are in accordance with those of Fadda et al., (2008). Similar susceptibility of *Candida albicans* isolates was also reported by Mokaddas et al., (2007). Also the finding was correlated with those of a study done by other authors[14]in which *Candida tropicalis* were 86% susceptible to Amphotericin-B, Itraconazole & Voriconazole while showed 25% resistance to Fluconazole. In *Candida glabrata* showed 100% sensitive to Amphotericin-B which was compared with present study. It was seen that *Candida globsa*, *Candida famata*, *Candida rugosa* & *Candida guilliermondii* were sensitive to 100% from all drugs.

CONCLUSION

The successful treatment of *Candida* infections depends on the early identification of the species and sensitivity patterns to antifungal agents.The shift towards *non albicans Candida species* as a causative agent has generated the concern because they are more resistance to antifungal as compared to *Candida albicans*. Therefore species identification of *Candida* isolates along with their antifungal susceptibility pattern can help the clinicians better in treating invasive *Candida* infection.Toconclude,changing epidemiology with infection by *non-albicans Candida spp.*, is a emerging problem and in present scenario it is essential to speciation and perform antifungal susceptibility testing on all *Candida* isolates.

ACKNOWLEDGEMENT

We would like to thanks Dr. Atul Garg Assistant Professor and Head Department of Microbiology, G.S.V.M. medical college, Kanpur for reviewing, the manuscript and giving his expert opinion.

Table no. 1 showing various samples processed for *Candida* isolates

S.No.	Clinical Specimen	Number and Percentage
1	Urine	107(39%)
2	Sputum	51(18%)
3	Endotracheal aspirates	28(10%)
4	Blood culture	26(9%)
5	Centre line tip	22(8%)
6	High vaginal swab	12(4%)
7	Pus	10(3%)
8	Throat swab	4(1%)
9	Broncho Alveolar Lavage	4(1%)
10	CSF	4(1%)
11	Other body fluid	2(0.7%)
Total	Total	270

Table no. 2 Age wise distribution of patient infected *Candidaspp.*

Age group	Sex	Isolated patient	Percentage (%)
0-20	M-21 F-30	51	18.8%

Volume : 6 | Issue : 8 | August 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

21-40	M-23 F-45	68	25.2%
41-60	M-27 F- 39	66	24.4%
61-80	M-28 F-32	60	22.2%
81-100	M-08 F-17	25	9.2%
Total		270	100%

Table No.3 Speciation of *Candida* isolates on study

S.No.	Candida species	Number and percentage
1	C.albicans	105(38%)
2	C.tropicalis	82(30%)
3	C.glabrata	26(9%)
4	C.sake	16(6%)
5	C.dubliniensis	12(4%)
6	C.kruseri	9(3%)
7	C.intermedia	7(2%)
8	C.sphaerica	5(2%)
9	C.globsa	2(0.74%)
10	C.famata	2(0.74%)
11	C.rugosa	2(0.74%)
12	C.guilliermondii	2(0.74%)
	Total	270

Table No.4 Resistant pattern of *Candida*

SPECIES	NO.OF ISOLATES	VORICONAZOLE	FLUCONAZOLE	ITRACONAZOLE	AMPHOTERICIN-B	FLUCYTOSINE
C.albicans	105(38.8%)	33(31.43%)	24(23%)	33(31.43%)	23(22%)	24(23%)
C.tropicalis	82(30.3%)	14(17%)	16(19.6%)	30(36.6%)	10(12.2%)	7(8.6%)
C.glabrata	26(9.6%)	5(19.23%)	12(46.15%)	14(53.84%)	7(27%)	10(38.46%)
C.sake	16(5.9%)	7(43.75%)	3(18.75%)	7(43.75%)	5(31.25%)	3(18.75%)
C.dubliniensis	12(4.4%)	1(8.33%)	1(8.33%)	3(25%)	1(8.33%)	10(83.33%)
C.krusrii	9(3.3%)	9(100%)	9(100%)	9(100%)	3(33.33%)	2(22.22%)
C.intermedia	7(2.6%)	5(71.42%)	5(71.42%)	3(42.85%)	5(71.42%)	5(71.42%)
C.sphaerica	5(1.8%)	1(20%)	1(20%)	1(20%)	3(60%)	3(60%)
C.famata	2(0.75%)	0(0%)	2(100%)	2(100%)	0(0%)	2(100%)
C.globsa	2(0.75%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
C.rugosa	2(0.75%)	0(0%)	0(0%)	0(%)	0(%)	0(%)
C.guillermondii	2(0.75%)	2(100%)	2(100%)	2(100%)	0(0%)	0(0%)

REFERENCES

[1] Bassetti M, Righi E, Costa A, Fasce R, Molinari MP, RossoR, Pallavicini FB, Viscoli C. Epidemiological trends in nosocomial candidemia in intensive care. BMC Infect Dis 2006; 6:21

[2] Sobel JD, Vazquez J. Candidiasis in the intensive care unit. SeminRespir-Crit Care Med 2003; 24: 99-112

[3] Shaheen MA, Taha M. Species identification of Candida isolates obtained from oral lesions of hospitalised and non hospitalised patients with oral candidiasis. Egyptian Dermatology Online Journal 2006; 2(1).

[4] ChanderJ. A text book of Medical Mycology, Candidiasis 3rd ed New Delhi: Mehta Publishers; 2009. pp. 266-90

[5] V. Manchanda, S. Agarwal, N. Verma. Yeast identification in routine clinical Microbiolgylaboratory and its clinical relevance Indian journal of Medical Microbiology 2011;29(2):172

[6] Lata R Patel, JayshriDPethani, Palak Bhatia, Sanjay D Rathod, Parul D Shah. Prevalence of Candida infection and its Antifungal susceptibility pattern in tertiary Care hospital, Ahmadabad. Nat J Med Res Vol. 2(4) 2012, 439-441.

[7] Dalal PJ, Kelkar SS. Clinical patterns of Candida infections in Bombay. Indian J Dermatol venereal Leprol1980; 46(1):31-2.

[8] Pfaller MA. Nosocomial candidiasis: the emerging species reservoirs and the modes of transmission. Clin Infect Dis 1996; 22:89-94.

[9] Nguyen MH, Peacock JE, Morris AJ, Tanner DC, NguyenML,SnydmanDr et al. The changing face of Candidaemia: the emergence of the non-C. albicans species and antifungal resistanceAMJ Med 1996;100(6): 617-23

10] RaginiAnanthKashid, SandhyaBelawadi, Gaytri Devi, IndumalCharacterisation and antifungal susceptibility testing for Candida in a tertiary care hospital. Journal of Health Sciences& Research; 2011;2(2):1-12.

[11] Dr.Vijaya D., Dr.harsha T.R., Dr. Nagaratnamma T, Candida speciation using chrom agar. Journal of clinical area Diagnostic research 2011; 5(4):755-7.

[12] Fadda ME, Podda GS, Pisano MB, Deplano M, Cosentino S, 2008. Prevalence of Candida species in different hospital wards and their susceptibility to antifungal agents: results of a three year survey. Journal of Preventive Medicine and Hygiene, 49(2): 69-74.

[13] Mokaddas EM, Al–SweihNa,KhanZU,2007. Species distribution and antifungal susceptibility of Candida bloodstream isolates in Kuwait; a10 year study. Journal of Medical Microbiology, 56(Pt 2) 255-259.

[14] ShivanandDharwad,Saldanha Dominic R M species identification of Candida Isolates in various clinical specimens with their antifungal susceptibility patterns.Journal of Clinical and Diagnostic research.2011 ; 5 (6) (suppl-1) : 1177-1181.