

Antifungal Susceptibility Pattern of Candida Isolates from Admitted Patients in a Tertiary Care Hospital, Kolkata

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Abstract: Background: Antifungal susceptibility testing is essential for guiding rational treatment of candidiasis. Non-albicans Candida (NAC) species frequently show reduced susceptibility to azoles and polyenes compared with Candida albicans, making species-directed susceptibility data important for empirical therapy decisions. Methods: In a one-year prospective study at a tertiary care hospital in Kolkata, 101 Candida isolates recovered from admitted patients were tested for antifungal susceptibility by the disc diffusion method (CLSI guideline M44-A2) against fluconazole, itraconazole, voriconazole, and amphotericin B. Results: Overall, 78.2% of isolates were susceptible to fluconazole, 73.26% to itraconazole, 36.63% to voriconazole, and 27.7% to amphotericin B. Candida albicans showed the highest susceptibility across agents (93% to fluconazole and itraconazole, 70% to voriconazole, 43.3% to amphotericin B). Several non-albicans species, including Candida auris, Candida duobushaemulonii, and Candida haemulonii, showed complete resistance to all four antifungals tested. Conclusion: Fluconazole retained the best overall activity, while amphotericin B resistance was highest by disc diffusion. Non-albicans Candida species showed substantially greater resistance than Candida albicans across all agents, supporting species-directed susceptibility testing to guide antifungal therapy.

Keywords: Candida; antifungal susceptibility; fluconazole; amphotericin B; non-albicans Candida; drug resistance

1. Introduction

Antifungal susceptibility testing guides the treatment of candidiasis and helps track emerging resistance patterns. While Candida albicans has traditionally shown predictable susceptibility to azole antifungals, non-albicans Candida (NAC) species are increasingly recognised as important pathogens with more variable, and often reduced, susceptibility to commonly used agents [36,63]. This has direct implications for empirical antifungal selection, which is frequently made before species identification and susceptibility results are available.

This study was undertaken to determine the antifungal susceptibility pattern of Candida isolates obtained from admitted patients at a tertiary care hospital in Kolkata, with particular attention to differences between Candida albicans and non-albicans species.

2. Materials and Methods

This prospective study was conducted in the Department of Microbiology of a tertiary care hospital in Kolkata over a one-year period. Candida isolates were recovered from clinical samples of hospital-admitted patients with suspected fungal infection and identified to species level using conventional phenotypic methods. Antifungal susceptibility testing was performed on all 101 confirmed Candida isolates by the disc diffusion method, following Clinical and Laboratory

Standards Institute (CLSI) guideline M44-A2, against four antifungal agents: fluconazole, itraconazole, voriconazole, and amphotericin B. Results were recorded as number and percentage of isolates susceptible per species and overall.

3. Results

Overall Susceptibility

Among 101 Candida isolates tested, fluconazole showed the highest susceptibility rate (78.2%), followed by itraconazole (73.26%). Susceptibility to voriconazole (36.63%) and amphotericin B (27.7%) was considerably lower (Table 2). Correspondingly, amphotericin B showed the highest overall resistance (72.3%), followed by voriconazole (63.37%), itraconazole (26.74%), and fluconazole (21.8%).

Species-wise Susceptibility

Candida albicans was the most uniformly susceptible species, with 93% of isolates susceptible to both fluconazole and itraconazole, 70% to voriconazole, and 43.3% to amphotericin B. In contrast, non-albicans species showed markedly more heterogeneous and generally lower susceptibility. Candida tropicalis, the most numerous isolate, showed 71.4% susceptibility to fluconazole but only 19% to amphotericin B. Candida glabrata showed reduced fluconazole susceptibility (40%). Candida auris, Candida duobushaemulonii, and Candida haemulonii showed complete (0%) susceptibility to all four agents tested (Table 1).

Table 1: Number (%) of isolates susceptible to each antifungal agent, by species

Species	n	Fluconazole	Itraconazole	Voriconazole	Amphotericin B
<i>C. albicans</i>	30	28 (93%)	28 (93%)	21 (70%)	13 (43.3%)
<i>C. tropicalis</i>	42	30 (71.4%)	29 (69%)	7 (16.67%)	8 (19%)
<i>C. dubliniensis</i>	2	2 (100%)	2 (100%)	1 (50%)	1 (50%)
<i>C. guilliermondii</i>	5	5 (100%)	4 (80%)	1 (20%)	3 (60%)
<i>C. rugosa</i>	3	3 (100%)	3 (100%)	1 (33.3%)	0 (0%)
<i>C. parapsilosis</i>	1	1 (100%)	1 (100%)	1 (100%)	0 (0%)
<i>C. krusei</i>	1	1 (100%)	0 (0%)	0 (0%)	0 (0%)
<i>C. glabrata</i>	5	2 (40%)	1 (20%)	0 (0%)	0 (0%)
<i>C. viswanathii</i>	1	1 (100%)	1 (100%)	1 (100%)	1 (100%)
<i>C. auris</i>	3	0 (0%)	0 (0%)	0 (0%)	0 (0%)
<i>C. inconspicua</i>	1	1 (100%)	1 (100%)	1 (100%)	1 (100%)
<i>C. kefyr</i>	1	1 (100%)	1 (100%)	1 (100%)	0 (0%)
<i>C. pelliculosa</i>	2	2 (100%)	1 (50%)	1 (50%)	1 (50%)
<i>C. zeylanoides</i>	1	1 (100%)	1 (100%)	0 (0%)	0 (0%)
<i>C. duobushaemulonii</i>	1	0 (0%)	0 (0%)	0 (0%)	0 (0%)
<i>C. famata</i>	1	1 (100%)	1 (100%)	1 (100%)	0 (0%)
<i>C. haemulonii</i>	1	0 (0%)	0 (0%)	0 (0%)	0 (0%)
TOTAL	101	79 (78.2%)	74 (73.26%)	37 (36.63%)	28 (27.7%)

Table 2: Overall resistance rate by antifungal agent, across all 101 isolates

Antifungal agent	Overall resistance (%)
Fluconazole	21.8
Itraconazole	26.74
Voriconazole	63.37
Amphotericin B	72.3

4. Discussion

The clear separation in susceptibility between *Candida albicans* and most non-*albicans* species observed in this study is consistent with previous reports describing greater antifungal resistance among NAC species [36,63,64]. The complete resistance observed in isolates such as *Candida auris* is of particular concern, given this species' recognised association with multidrug resistance and nosocomial transmission.

The high overall resistance to amphotericin B observed by disc diffusion should be interpreted with some caution, as disc diffusion methods for polyenes are known to correlate less consistently with clinical outcome than azole susceptibility testing; confirmation using minimum inhibitory concentration (MIC)-based methods would strengthen these findings. Nonetheless, the overall pattern- good fluconazole activity against *C. albicans* but reduced activity against several non-*albicans* species- supports avoiding fluconazole as blanket empirical therapy once a non-*albicans* species is suspected or confirmed [79].

Limitations of this study include its single-centre design, use of disc diffusion rather than MIC-based testing, and the small number of isolates available for several individual non-*albicans* species, which limits the precision of species-specific resistance estimates.

5. Conclusion

Among 101 *Candida* isolates from a tertiary care hospital, fluconazole retained the best overall activity, while amphotericin B resistance was highest by disc diffusion testing. Non-*albicans* *Candida* species, particularly *Candida auris*, showed substantially greater resistance than *Candida*

albicans across all four agents tested, reinforcing the value of species-level identification and susceptibility testing in guiding antifungal therapy.

Conflict of Interest

The authors declare no conflict of interest.

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