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**Original Research Article**

# Candidemia Caused by *Candida tropicalis* at Hassan II University Hospital, Fez, Morocco: A 10-Year Retrospective Study

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## Abstract

***Introduction:*** Candidemia is a severe invasive fungal infection caused by *Candida* species. It primarily affects immunocompromised patients and those admitted to intensive care units. Depending on the geographic region, *Candida tropicalis* ranks as the second or third most common cause of candidemia and is associated with high mortality. ***Materials and Methods:*** We conducted a retrospective descriptive study at Hassan II University Hospital in Fez, Morocco, from January 2016 to October 2025. We included all patients with blood cultures positive for *C. tropicalis*. We identified the isolates using culture, biochemical tests, and multiplex polymerase chain reaction (PCR). We performed antifungal susceptibility testing to assess susceptibility to the antifungal agents tested. ***Results:*** We included 33 patients, accounting for 21.9% of all candidemia cases. The mean age was 32 years, and the study population included 11 females and 22 males. The reported risk factors included neutropenia (9 cases), central venous catheter colonization (5 cases), and prior broad-spectrum antibiotic therapy (all patients). Among the isolates with reported susceptibility results, 16 were susceptible to all tested antifungal agents, 9 were susceptible only to caspofungin, and 3 were reported as multidrug-resistant. Overall mortality was 57.6%. ***Conclusion:*** *C. tropicalis* is an important cause of severe candidemia. The main reported risk factors were neutropenia, central venous catheter colonization, and prior exposure to broad-spectrum antibiotics. The high mortality rate and reported antifungal resistance highlight the importance of early diagnosis, appropriate antifungal treatment, and targeted preventive measures.

**Keywords:** Candidemia; *Candida tropicalis*; antifungal resistance; risk factors; antifungal susceptibility testing; blood culture.

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## INTRODUCTION

Candidemia is a severe infection defined by the presence of *Candida* species in the bloodstream, indicating hematogenous dissemination of the fungus. *Candida albicans* is the most common causative species, followed by non-*albicans Candida* species [1].

Among non-*albicans Candida* species, *Candida tropicalis* plays an important role in candidemia epidemiology, although its distribution varies across geographic regions. It ranks second in some regions of Asia and South America but fourth in a European multicenter study [2,3]. This species is frequently isolated from hospitalized patients, particularly those admitted to intensive care units and those who are immunocompromised. It is also associated with high mortality [4,5].

This study aimed to determine the prevalence of candidemia caused by *C. tropicalis*, identify risk and prognostic factors, assess clinical outcomes, and investigate antifungal resistance in this yeast.

## MATERIALS AND METHODS

We conducted a retrospective descriptive study from January 2016 to October 2025, covering a period of 9 years and 10 months. We included patients of all ages who underwent blood culture testing in adult and pediatric departments at Hassan II University Hospital in Fez, Morocco.

We inoculated the collected blood into Mycosis blood culture bottles and incubated them for 5 days in an automated BD BACTEC system (models 9050 or FX40; manufacturer location and country to be confirmed).

We subcultured positive bottles in which direct examination revealed yeast cells onto 3 culture media: plain Sabouraud agar, Sabouraud agar supplemented with chloramphenicol, and Sabouraud agar supplemented with actidione and chloramphenicol.

We identified the isolates based on the following criteria:

- Macroscopic and microscopic colony characteristics.
- Germ tube testing.
- Immunological tests for *C. albicans*, *C. dubliniensis*, and *C. krusei*.
- Biochemical tests using the API 20C AUX and Candida AUXACOLOR systems.
- Multiplex PCR in selected cases.

We included all patients whose isolates were identified as *C. tropicalis*. We excluded patients whose isolates belonged to other *Candida* species or non-*Candida* organisms.

After species identification, we performed antifungal susceptibility testing using the Etest gradient diffusion method. We tested fluconazole, voriconazole, and caspofungin, depending on availability. Flucytosine was also mentioned in the reported susceptibility results; its inclusion in the testing protocol requires confirmation.

## RESULTS

We included 33 patients with *C. tropicalis* candidemia, representing 21.9% of all candidemia cases. Of these patients, 7 had acute leukemia, 2 had solid tumors, and 24 had been hospitalized following polytrauma.

The study population comprised 11 females and 22 males, yielding a male-to-female ratio of 2:1. The mean age was 32 years, with a range of 1–73 years. The cohort included 21 adults and 12 children.

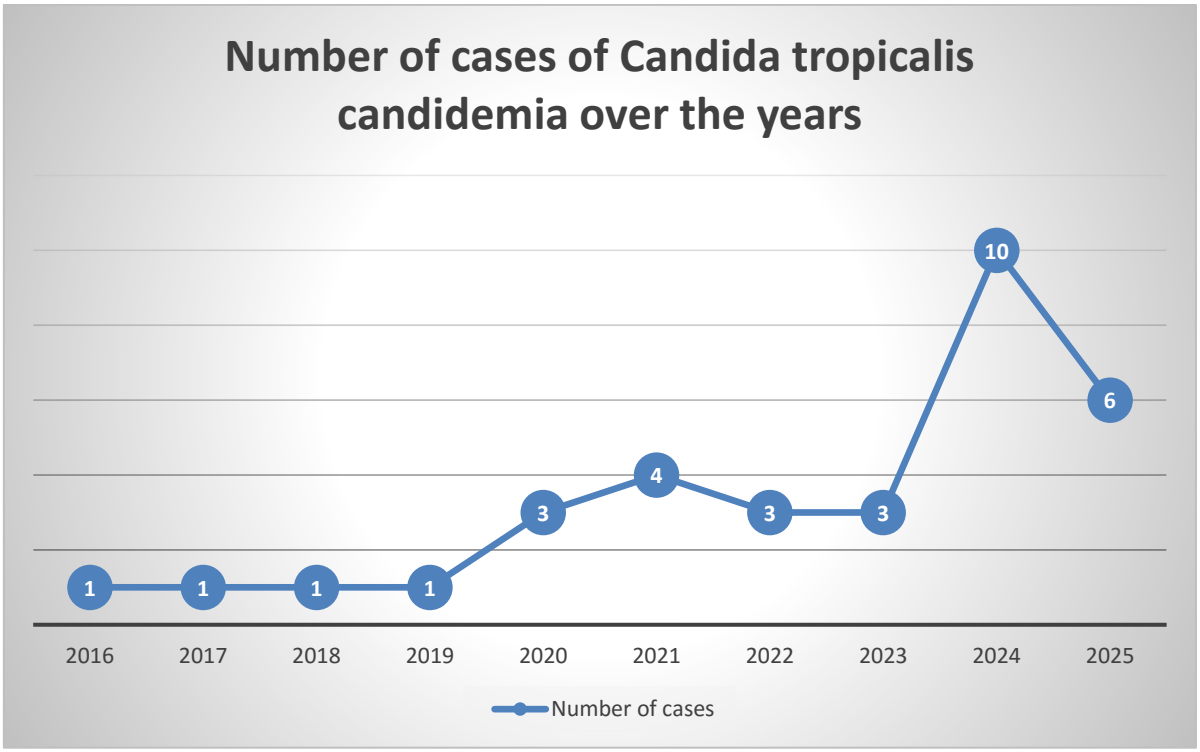



**Figure 1: Annual prevalence of candidemia caused by *Candida tropicalis* during the study period.**

Nine patients had neutropenia. Five additional patients without neutropenia had central venous catheter colonization. All patients had received broad-spectrum antibiotic therapy before the candidemia episode.

Blood cultures became positive after a mean of 2.5 days of incubation. The microbiological diagnosis relied on fungal isolation on Sabouraud agar, followed by biochemical identification using the API 20C AUX, API Candida, and AUXACOLOR systems. These methods identified *C. tropicalis* in all included cases.

Antifungal susceptibility testing yielded the following reported results (Figure 2):

- Sixteen isolates were susceptible to caspofungin, fluconazole, voriconazole, and flucytosine.
- Nine isolates were susceptible only to caspofungin.
- Three isolates were reported as multidrug-resistant.

The available categories account for 28 isolates. Susceptibility results for the remaining 5 isolates require clarification.

All patients received antifungal treatment. Twenty patients received fluconazole, and 13 received amphotericin B.

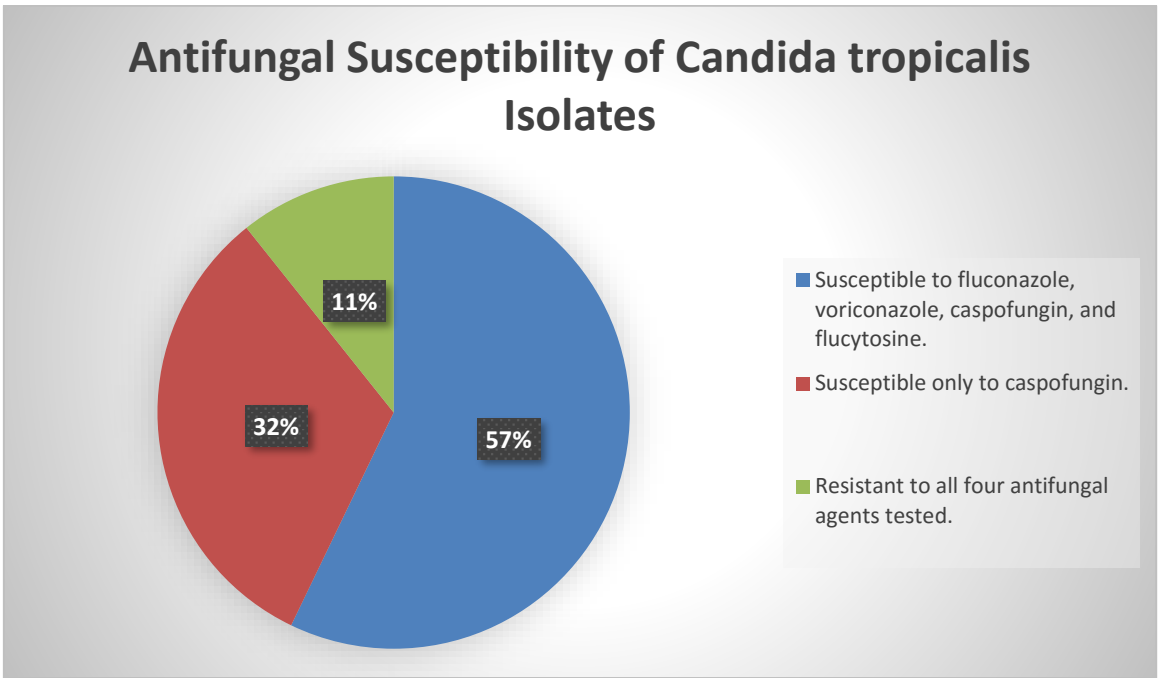



**Figure 2: Antifungal susceptibility profiles of *Candida tropicalis* isolates**

The median length of hospital stay was 29 days, with a range of 7–60 days. Clinical outcomes were favorable in 14 patients, whereas 19 patients died, corresponding to an overall mortality rate of 57.6%.

## DISCUSSION

Candidemia caused by *Candida tropicalis* is a major concern in hospital settings, particularly among immunocompromised and critically ill patients. This species accounts for 10%–30% of candidemia cases in published studies [6]. Our findings fall within this range, as *C. tropicalis* accounted for 21.9% of all candidemia cases in our study.

In Morocco, 2 studies reported a frequency of 35%: one at Ibn Rochd University Hospital in Casablanca between 2014 and 2016 and another at Mohammed VI University Hospital in Marrakech between 2021 and 2024 [7,8].

In China, a study of 209 candidemia episodes recorded between March 2020 and February 2024 identified *C. tropicalis* in 17.2% of cases (36/209) [9].

The risk factors identified in our study, including neutropenia, central venous catheter colonization, and prior exposure to broad-spectrum antibiotics, have also been reported in the literature. These factors may increase the risk of invasive candidiasis through mechanisms involving fungal translocation and bloodstream dissemination. Patients with polytrauma and those admitted to intensive care units are particularly vulnerable because they often undergo invasive procedures and receive broad-spectrum antimicrobial therapy [10].

Emerging antifungal resistance is another major concern. Several studies have reported azole resistance in *C. tropicalis* and have raised concerns about resistance to echinocandins, particularly in hospital settings with extensive antifungal use [11,12]. These findings support the need for continued microbiological surveillance and appropriate antifungal susceptibility testing to guide treatment and reduce the risk of therapeutic failure.

Mortality associated with *C. tropicalis* candidemia remains high, ranging from 40% to 60% in published studies. Our study found a mortality rate of 57.6%, reflecting the severity of the infection and the vulnerability of affected patients [10,13]. This finding highlights the importance of early diagnosis and prompt initiation of appropriate antifungal therapy, particularly in intensive care units and among immunocompromised patients. Combining culture-based methods with molecular techniques may also help improve diagnostic performance when clinically indicated [1,13].

## CONCLUSION

Candidemia caused by *Candida tropicalis* is a severe infection that frequently affects immunocompromised patients and patients with polytrauma. The main reported risk factors were

neutropenia, central venous catheter colonization, and prior exposure to broad-spectrum antibiotics. Mortality remained high, and the reported antifungal resistance patterns highlight the need for early diagnosis and appropriate treatment. Preventive strategies should focus on active surveillance and optimal management of patients at increased risk [9,13].

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