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ORIGINAL ARTICLE/ARTICLE ORIGINAL

Species distribution and antifungal susceptibility of *Candida* spp. isolated from superficial candidiasis in outpatients in Iran



Distribution des espèces et sensibilité aux antifongiques de Candida spp. isolé de candidose superficielle chez les malades en consultation externe en Iran

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KEYWORDS

Candidiasis;
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Antifungal drugs;
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CHROMagar *Candida*;
Disk diffusion

Summary

Objective. – Candidiasis is the most prevalent fungal infection affecting human and animals all over the world. This study represents the epidemiological aspects of superficial candidiasis in outpatients and in vitro antifungal susceptibility of etiologic *Candida* species.

Patients and methods. – Clinical samples were taken from 173 patients including skin and nail scrapings (107; 61.8%), vaginal discharge (28; 16.2%), sputum (20; 11.6%), oral swabs (7; 4.0%), bronchoalveolar lavage (6; 3.5%) and 1 specimen (0.6%) of each eye tumor, gastric juice, urine, biopsy and urinary catheter and confirmed as candidiasis by direct microscopy, culture and histopathology. Susceptibility patterns of the isolated *Candida* species were determined using the disk diffusion and broth microdilution methods.

Results. – Among 173 *Candida* isolates, *C. albicans* (72.3%) was the most prevalent species followed by *C. parapsilosis* (11.5%). Other identified species were *C. glabrata*, *C. krusei*, *C. tropicalis*, *C. guilliermondii*, *C. intermedia* and *C. sake*. Majority of the *Candida* isolates were susceptible to fluconazole (95.4%) followed by 5-flucytosine (89.6%), voriconazole (78.6%)

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MOTS CLÉS

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Diffusion des disques

itraconazole (48.0%) and ketoconazole (42.8%). Caspofungin was the most potent antifungal drug against *C. albicans* (MICs; 0.062–1 µg/mL), ketoconazole for *C. parapsilosis* and *C. tropicalis* (MICs; 0.031–0.25 µg/mL) and itraconazole for *C. krusei*, *C. glabrata* and *C. guilliermondii* (MICs; 0.031–1 µg/mL).

Conclusion. – This study reinforces the significance of superficial candidiasis as an important fungal infection with multiple clinical presentations. Our results further indicate that susceptibility testing to commonly used antifungals is crucial in order to select the appropriate therapeutic strategies which minimize complications while improving patients' life.

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Résumé

Objectif. – La candidose est l'infection fongique la plus courante chez les animaux et l'homme partout dans le monde. Cette étude présente les aspects épidémiologiques de la candidose superficielle chez les patients et la sensibilité antifongique in vitro des espèces de *Candida* isolées.

Patients et méthodes. – Les prélèvements cliniques ont été effectués sur 173 patients, il s'agit de la peau et des ongles (107 ; 61,8 %), des sécrétions vaginales (28 ; 16,2 %), de l'expectoration (20 ; 11,6 %), de prélèvements oraux (7 ; 4,0 %), de lavage broncho-alvéolaire (6 ; 3,5 %) et d'un échantillon (0,6 %) de tumeur de l'œil, de suc gastrique, d'urine, de biopsie et d'un cathéter urinaire. Ils ont été confirmés par l'examen direct, la culture et l'histopathologie comme candidose. La sensibilité des souches de *Candida* isolées a été déterminée par la méthode des disques et la méthode de microdilution.

Résultats. – Parmi 173 isolats de *Candida*, l'espèce la plus fréquente a été *C. albicans* (72,3 %), suivie par *C. parapsilosis* (11,5 %). Les autres espèces identifiées ont été *C. glabrata*, *C. krusei*, *C. tropicalis*, *C. guilliermondii*, *C. intermedia* et *C. sake*. La majorité des isolats de *Candida* s'est montrée sensible au fluconazole (95,4 %), suivie par la 5-flucytosine (89,6 %), le voriconazole (78,6 %), l'itraconazole (48,0 %) et le kétoconazole (42,8 %). La caspofungine a été le médicament le plus efficace contre *C. albicans* (CMI ; 0,062–1 µg/mL), le kétoconazole pour *C. parapsilosis* et *C. tropicalis* (CMI ; 0,031–0,25 µg/mL) et l'itraconazole pour *C. krusei*, *C. glabrata* et *C. guilliermondii* (CMI ; 0,031–1 µg/mL).

Conclusion. – Cette étude montre l'importance de la candidose superficielle ayant des présentations cliniques différentes. Les résultats obtenus par cette étude montrent la nécessité de faire le test de sensibilité aux médicaments couramment utilisés pour choisir les meilleures stratégies de traitement en vue de diminuer les complications de la maladie et améliorer la qualité de vie des patients.

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Introduction

Worldwide occurrence of fungal infections has dramatically been increased in recent years due to a continuous augment in immunosuppressive conditions like AIDS, and other predisposing factors including organ transplantation, leukemia, broad-spectrum antibiotics, indwelling catheters, diabetes and intravenous drug misuse. Superficial mycoses caused by species of the genus *Candida* has been reported from all over the world. They include some of the most common mucosal infections, such as thrush, vaginal candidiasis, cutaneous candidiasis, onychomycosis and chronic mucocutaneous candidiasis [34]. It has been estimated that an approximate of 20 to 30% of women have vaginal *Candida* colonization. The prevalence of oral cavity colonization by yeasts in normal individuals varies, from 20 to 40% in the general population. In the medical community, oral candidiasis and vaginitis caused by *Candida* account for a significant number of clinical complaints brought to colleagues of different specialties. The prevalence of carriage is greater in hospitalized patients and in those with conditions that predispose to candidiasis.

Among *Candida* species, *C. albicans* is responsible for the majority cases of superficial candidiasis. However, increasing

numbers of other species such as *C. tropicalis*, *C. parapsilosis*, *C. glabrata*, *C. guilliermondii* have been reported as common etiologic agents [10,34]. Different methods with a wide range of successfulness have been used for identification of *Candida* species isolated from clinical specimens. Aside from conventional morphological and biochemical methods, a vast array of novel techniques including molecular assays, MALDI-TOF mass spectrometry, specific antibody-based agglutination techniques and omics analyses have been successfully used for identification of *Candida* species and clinical candidiasis [11,25,29]. A combination of such methods increases considerably the chance of reliable identification of *Candida* at the genus and species level [20].

Besides the necessity for identification of *Candida* isolates at species level, dramatic emergence of multidrug resistance urged the scientists to determine susceptibility patterns of this commensal pathogen of human and animals to commonly used antifungal agents. In this way, isolation and identification of causative *Candida* species and determination of their susceptibility to antifungal drugs is important for ensuring the efficacy of therapeutic strategies.

Like as many other parts of the world, fungal infections are major concerns in Iran with an increasing numbers of new

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