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ORIGINAL ARTICLE/ARTICLE ORIGINAL

Species distribution and susceptibility of *Candida* isolates from patient with vulvovaginal candidiasis in Southern China from 2003 to 2012

Répartition et sensibilité des espèces de Candida *provenant de patientes avec une candidose vulvo-vaginale en Chine du Sud de 2003 à 2012*

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KEYWORDS
Vulvovaginal candidiasis;
Candida species;
Susceptibility

Summary
Objective. — To determine the *Candida* species involved and the antifungal susceptibility of *Candida* species isolated from patients with vulvovaginal candidiasis (VVC).
Materials and methods. — *Candida* organisms were cultured from samples obtained from patients with VVC at Gynecology Department of Peking University Shenzhen Hospital from April 2003 to September 2012. Antifungal susceptibility testing was performed using a commercial agar diffusion test.
Results. — A total of 3181 yeasts isolates, mostly *Candida*, were obtained from 3141 patients with VVC. Two species of *Candida* were isolated from each of 40 patients (1.3%, 40/3141). *C. albicans* were the predominant *Candida* species (2705 strains, 85.0%) in VVC, followed by *C. glabrata* (337 strains, 10.6%), *C. parapsilosis* (49 strains, 1.5%), *C. tropicalis* (31 strains, 1.0%), *Saccharomyces cerevisiae* (23 strains, 0.7%), *C. krusei* (15 strains, 0.5%), *Candida famata* (11 strains, 0.4%), *Rhodotorula* sp. (6 strains, 0.2%), *and C. lusitaniae* (2 strains, 0.1%). Antifungal susceptibility was tested in a total of 1942 strains from patients with VVC. All of the *C. albicans* isolates obtained were susceptible to nystatin. The resistant rate of *C. albicans* to fluconazole,

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itraconazole, miconazole, clotrimazole was 1.1% (18/1612), 2.2% (36/1612), 4.2% (68/1612), and 0.9% (14/1612). The resistant rate of non-albicans to fluconazole, itraconazole, miconazole, and clotrimazole was 11.8% (39/329), 2.5% (8/329), 1.8% (6/329), and 4.3% (14/329).
Conclusions. — *C. albicans* was the predominant *Candida* species isolated from this series of patients with VVC. Resistance of vaginal *C. albicans* isolates to antifungal agents was infrequent.

MOTS CLÉS
Candidose vulvo-vaginale ;
Espèces de *Candida* ;
Sensibilité

Résumé
Objectif. — Déterminer les espèces de *Candida* impliquées et la sensibilité aux antifongiques des espèces de *Candida* isolées de patientes avec une candidose vulvo-vaginale (CVV).
Patients et méthodes. — Les prélèvements ont été cultivés à partir d'échantillons obtenus de patientes avec une CVV au département de gynécologie de l'hôpital de l'université de Pékin à Shenzhen d'avril 2003 à septembre 2012. Les tests de sensibilité aux antifongiques ont été effectués en utilisant un test commercial de diffusion dans l'agar.
Résultats. — Un total de 3181 isolats de levures, la plupart *Candida*, ont été obtenus de 3141 patientes avec une CVV. Deux espèces de *Candida* ont été isolées de chacune des 40 patientes (1,3 %, 40/3141). *C. albicans* était l'espèce prédominante (2705 souches, 85,0 %) dans les CVV, suivie de *C. glabrata* (337 souches, 10,6 %), *C. parapsilosis* (49 souches, 1,5 %), *C. tropicalis* (31 souches, 1,0 %), *Saccharomyces cerevisiae* (23 souches, 0,7 %), *C. krusei* (15 souches, 0,5 %), *Candida famata* (11 souches, 0,4 %), *Rhodotorula* sp. (6 souches, 0,2 %) et *C. lusitaniae* (2 souches, 0,1 %). La sensibilité aux antifongiques a été testée sur un total de 1942 souches de *Candida* de patientes avec une CVV. Tous les isolats de *C. albicans* étaient sensibles à la nystatine. Le taux de *C. albicans* résistants au fluconazole, à l'itraconazole, au miconazole et au clotrimazole était de 1,1 % (18/1612), 2,2 % (36/1612), 4,2 % (68/1612) et 0,9 % (14/1612), respectivement. Le taux de non-albicans résistants au fluconazole, à l'itraconazole, au miconazole et au clotrimazole était de 11,8 % (39/329), 2,5 % (8/329), 1,8 % (6/329) et 4,3 % (14/329), respectivement.
Conclusions. — *C. albicans* était l'espèce prédominante de *Candida* isolée de cette série de patientes avec une CVV. La résistance des isolats vaginaux de *C. albicans* aux agents antifongiques était peu fréquente.

Introduction

Vulvovaginal candidiasis (VVC) is among the most common diagnosis in women seeking gynecological care. *C. albicans* is the major etiological agent involved in cases of VVC, while the results of other reports have shown an increase in the prevalence of non-albicans, mainly associated with *C. glabrata*, in VVC [1,15,18]. Most non-albicans *Candida* species have higher azole MICs, and infections they cause are often difficult to treat [15,18]. The increasing number of cases caused by non-albicans *Candida* has complicated the diagnosis and treatment of VVC. We report the distribution of fungal strains, and the antifungal susceptibilities of *C. albicans* isolated from patient with VVC in Southern China from 2003 to 2012.

Materials and methods

Patients

A prospective study of 3141 consecutive patients with VVC was performed at the Gynecology Department of the Peking University Shenzhen Hospital from April 2003 to September 2012. The research protocol was approved by the ethics committee of the hospital, and all subjects gave their informed consent to participate.

Case definition

A case of VVC was defined as a patient with vulvar itching, vaginal discharge, and a positive *Candida* culture. Confirmation was obtained by demonstration of blastoconidia and pseudohyphae on a wet vaginal slide treated with a drop of 10% potassium hydroxide.

Vaginal samples

A sample from the lateral vaginal wall was obtained with a sterile cotton-tipped swab. The swab was placed in a tube filled with saline prior to direct microscopic examination on a wet slide, to which a drop of 10% potassium hydroxide had been added. Culture was performed on samples obtained from all cases that had positive wet vaginal smears.

Identification methods

All specimens were plated on to CHROM agar (Biocell Laboratory Ltd, China) for 24—48 h at 37 °C in ambient air. Strains were identified using a standard system, API *Candida* (Biomerieux, France), and stored in medium containing 2% glucose, 2% peptone and 20% glycerol at −70 °C.

Antifungal susceptibility testing

We applied a simple random sampling method to collect *Candida* for detecting antifungal susceptibility based on using a commercial agar diffusion test (A/S Rosco, Taastrup, Denmark). The agar diffusion test was performed according to the manufacturer's instructions and M44-A guidelines as previously described [9]. Quality control isolates *C. albicans*