Virulence factors of candida species isolated from patients with bladder cancer and obstructive uropathy

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Abstract
Superficial and invasive candidiasis continues to be a problem for increasing population of immuno compromised patients. Alarmingly, these opportunistic yeasts are becoming more resistant to antifungal agents. Objectives: To study the prevalence of Candida species in patients with urinary tract infections (UTIs) associated with bladder cancer or obstructive uropathy. Also, to investigate the virulence factors of Candida species including; biofilms, secreted aspartic proteinases (SAPs) and phospholipase activity (PLA) as well as to test their susceptibility to antifungal agents including voriconazole. Methods: 250 patients with UTIs associated with bladder cancer and obstructive uropathy were studied. Candida species were identified by CHROM agar, rice agar-Tween 80 and biochemically by candifast. Biofilm formation was detected by tube adherence and spectrophotometric methods and was quantified using the XTT assay and crystal violet (CV) staining. PLA was screened using both Sabouraud and malt egg yolk agar. SAPs was detected using bovine serum albumin agar (BSA) and hemoglobin-containing medium. Their susceptibility to antifungal agents were evaluated using E test, candifast and disc diffusion methods. Results: The over all isolation rate of Candida species was 24 with the highest prevalence in obstructive uropathy patients. C. albicans was the most common (34.5%) followed by C. glabrata (29.5%) and C. tropicalis and C. krusei each 18%. Rice agar-Tween 80 and CHROM agar absolutely identify C. albicans, C. tropicalis and C. krusei isolates but C. glabrata could not be identified on CHROM agar. The over all sensitivity of candifast test was 90.2%. Biofilm formation, SAPs and PLA were detected in 39.3%, 44.3% and 72.1% of Candida isolates respectively. Voriconazole has greater in vitro activity than fluconazole against C. albicans, C. glabrata and C. krusei. In conclusion: Although C. albicans is the organism most often associated with UTIs, other species of Candida such as C. glabrata, C. tropicalis and C. krusei have emerged as important pathogens. Rice agar-Tween 80 is cheap and available culture medium for identification of Candida species. The tube adherence method for detection of biofilm formation and CV staining method for quantification of biofilm were simple and easy methods to perform. Sabouraud egg yolk agar and BSA were sensitive media for detection of PLA and SAPs activity respectively. Voriconazole has broad-spectrum in vitro activity against yeasts, including Candida species that are generally less susceptible to fluconazole. The initial antifungal screening of clinical isolates by the disc diffusion test on glucose methylene blue Mueller-Hinton agar method followed by confirmation of resistant strains by the E test method is desirable to optimize patient management. Routine screening for Candida species is recommended particularly for patients under broad spectrum antibiotic or those having diabetes mellitus, urinary catheter and impaired kidney function to avoid developing of UTIs by Candida species.

Keywords
Urinary tract infections, Biofilms, Aspartic proteinase, Sabouraud egg yolk, Bovine serum albumin,