Vulvovaginal candidiasis is a common problem. The majority of infections are caused by Candida albicans, but there is increased awareness of the role of yeasts other than C. albicans. It is important to identify these other yeasts because they tend to be less susceptible to the commonly used topical and oral azole antifungals\(^1\) \(^2\) and are associated more frequently with recurrent infection than C. albicans.\(^3\) Previous studies have been performed in tertiary care settings and included women with recurrent symptoms. Our study investigated the epidemiological and microbiological features of women carrying yeasts other than C. albicans by examining genital specimens collected in the primary care setting, including those taken for antenatal or sexual health screening purposes. In addition, in vitro susceptibility testing was performed on 40% of yeasts other than C. albicans.

### METHOD AND MATERIALS

The study was performed between April and June 2000. Samples were submitted to a large private pathology laboratory in Sydney, Australia, that services the general community. All genital swabs collected in Amies transport medium received from women during the study period were included. If swabs from more than one site were received these were plated out separately but considered as one item for statistical analysis and included as a positive culture if either sample grew yeasts. Swabs were cultured onto quarter plates of Candida ID media (BioMerieux), a chromogenic media that aids identification of candida species.\(^4\) Quantitation of yeast colonies was not attempted. All blue colonies were reported as C. albicans. All white or pink colonies were identified to species level using the Vitek YBC card (BioMerieux). In vitro susceptibility testing was performed on 53 out of 129 isolates of yeast other than C. albicans. Testing was performed by the broth microdilution technique according to the National Committee for Clinical Laboratory Standards (NCCLS) M27 A protocol against amphotericin B (AMB), fluconazole (FLU), itraconazole (ITZ), and voriconazole (VOR).\(^5\)

Data on age, pregnancy status, presence of diabetes, other pathogens isolated, and reason for submitting the sample were obtained from the request form. Statistical analysis was performed using the \(t\) test for equality of the means of age, and by the \(\chi^2\) test for other comparisons using SPSS PC+ software (version 7.0; SPSS, Chicago, IL, USA).

### RESULTS

Swabs were received from 5802 women. No samples were sent from specialists or from hospitalised patients. Yeast was isolated from 1221 women (21%). Of these, C. albicans only was isolated from 1087 (89%) and yeasts other than C. albicans from 129 (11%) women. C. glabrata comprised 89 (69%) of the latter. Women in whom other yeasts were recovered were older than those with C. albicans (mean 43, versus 33 years, \(p<0.001\)). All isolates tested \(n=53\) were susceptible to AMB and VOR. Seven (24%) C. glabrata strains were susceptible to FLU with 21 (72%) testing susceptible-dose dependent.

### Table 1  Distribution of yeast species other than C. albicans recovered from genital swabs

<table>
<thead>
<tr>
<th>Species</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. glabrata</td>
<td>89 (69)</td>
</tr>
<tr>
<td>C. parapsilosis</td>
<td>12 (9)</td>
</tr>
<tr>
<td>C. krusei</td>
<td>12 (9)</td>
</tr>
<tr>
<td>C. tropicalis</td>
<td>8 (6)</td>
</tr>
<tr>
<td>C. kefyr</td>
<td>1 (1)</td>
</tr>
<tr>
<td>S. cerevisiae</td>
<td>6 (5)</td>
</tr>
<tr>
<td>C. humicolus</td>
<td>1 (1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>129 (100)</td>
</tr>
</tbody>
</table>

The mean age of women with vulvovaginal C. albicans carriage was 33.3 years (SD 13.5) compared to 42.9 (15.9) years for women with other vulvovaginal yeasts \((p<0.001)\). All other yeast species with the exception of Saccharomyces cerevisiae and Cryptococcus humicolus were isolated from women with a mean age greater than that of women with C. albicans.

All isolates tested were susceptible to AMB and VOR (proposed breakpoint of 4 mg/l).\(^5\) C. kefyr and C. humicolus were susceptible to FLU and ITZ. Twenty nine strains of C. glabrata were tested, of which 21 (71%) tested susceptible-dose dependent (S-DD; MIC 16–32 mg/l), and one isolate was resistant (MIC.
DISCUSSION

Chromogenic agar such as Candida ID media are commonly used in microbiology laboratories and support the growth of Candida to the same extent as Sabouraud’s dextrose agar (SDA). Chromogenic agar enables mixed growth to be more easily identified. Neither the germ tube test nor Candida ID (SDA) distinguishes Candida to the same extent as Sabouraud’s dextrose agar used in microbiology laboratories and support the growth of C. glabrata against FLU was 8 mg/l.

Accepted risk factors for candida vaginitis include poorly controlled diabetes and pregnancy. A postulated risk factor for C. glabrata vaginitis is a more alkaline pH such as occurs with concomitant bacterial vaginosis. We explored these factors in our population but found no difference between C. albicans and C. glabrata in the rate of diabetes, pregnancy, or the isolation of co-pathogens. However, reliance on request forms would have been ineffective. There are few clinical data on the use of voriconazole for candida vaginitis; however, in vitro susceptibility testing of species isolated was more frequent isolated species. Most of the species isolated are less susceptible to the commonly used topical and oral azole agents which has implications for therapy.

ACKNOWLEDGEMENTS

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REFERENCES


5 National Committee for Clinical Laboratory Standards. Reference method for broth dilution antifungal susceptibility testing of yeasts approved standard M27-A. Wayne, PA, USA: National Committee for Clinical Laboratory Standards.


