Prevalence of *Trichomonas vaginalis* Isolates with Resistance to Metronidazole and Tinidazole

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Clinical isolates of *Trichomonas vaginalis* were obtained from women consecutively enrolled in a study of partner notification. Testing of susceptibility to metronidazole and tinidazole was performed. Resistance to metronidazole and tinidazole was present in 17/178 (9.6%) and 1/178 (0.56%) strains, respectively. In vitro resistance was poorly correlated with clinical response to treatment.

Trichomoniasis is a sexually transmitted parasitic infection associated with preterm birth and human immunodeficiency virus acquisition and transmission (2, 4, 10). Most infections are cured by a single dose of metronidazole; however, resistance among *Trichomonas vaginalis* strains has been noted for years (6, 7) and there is anecdotal evidence that resistance may be increasing. Tinidazole, a drug related to metronidazole, may be useful for treating strains of *T. vaginalis* that are resistant to metronidazole (12). There is very limited information on the prevalence of resistance to metronidazole among clinical isolates of *T. vaginalis*, especially temporal trends in resistance. Prevalence values of 2.5% and 5% have been reported in two studies (9, 11). However, no surveillance system exists to detect resistance. We conducted susceptibility testing for metronidazole and tinidazole among clinical isolates of *T. vaginalis* in order to determine baseline resistance rates and to begin examining trends in resistance over time.

Women attending the Jefferson County Department of Health Sexually Transmitted Diseases Clinic in Birmingham, AL, with newly diagnosed *T. vaginalis* infections were invited to participate in a study of partner notification methods for trichomoniasis. All women were initially treated with a 2-g single dose of metronidazole. As part of this study, cultures of *T. vaginalis* that are resistant to metronidazole (12). There is very limited information on the prevalence of resistance to metronidazole among clinical isolates of *T. vaginalis*, especially temporal trends in resistance. Prevalence values of 2.5% and 5% have been reported in two studies (9, 11). However, no surveillance system exists to detect resistance. We conducted susceptibility testing for metronidazole and tinidazole among clinical isolates of *T. vaginalis* in order to determine baseline resistance rates and to begin examining trends in resistance over time.

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MLCs of metronidazole were clinical failure rate and found that for 44% of the isolates the with a 2-g stat dose of metronidazole. They reported a 27% with trichomoniasis and treated with directly observed therapy October 1983 (8). They studied women who were diagnosed vaginalis obtained from women attending a sexually transmit-
for resistance to metronidazole among clinical isolates of T. vaginalis. Ongoing surveillance of this cohort will provide data on temporal trends in resistance to these two drugs.

In summary, among women enrolled in a study of partner notification for trichomoniasis, resistance to metronidazole, as defined by aerobic MLCs, was present in 9.6%. However, in vitro resistance to metronidazole was poorly correlated with clinical response to treatment. Rates of resistance to tinidazole were significantly lower than rates of resistance to metronida-

**REFERENCES**


**TABLE 1. MLCs for clinical isolates of T. vaginalis**

<table>
<thead>
<tr>
<th>Aerobic MLC (µg/ml)</th>
<th>Interpretation of level of resistance to metronidazole*</th>
<th>MLC (µg/ml)</th>
<th>Metronidazole</th>
<th>Tinidazole</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50</td>
<td>Practically none</td>
<td>161</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Very low</td>
<td>11</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Low</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>Moderate</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>&gt;200</td>
<td>High</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

* Determined in accordance with reference 6.

for resistance to metronidazole among clinical isolates of T. vaginalis obtained from women attending a sexually transmitted disease clinic in Columbus, Ohio, between July 1982 and October 1983 (8). They studied women who were diagnosed with trichomoniasis and treated with directly observed therapy with a 2-g stat dose of metronidazole. They reported a 27% clinical failure rate and found that for 44% of the isolates the MLC of metronidazole was ≥50 µg/ml. However, their study population included mainly women who had already failed therapy for trichomoniasis with metronidazole. They reported a correlation between response to therapy and in vitro resistance to metronidazole (8).

A 2001 study from Spain (9) reported on resistance to metronidazole and tinidazole in 91 T. vaginalis isolates collected between 1995 and 1999 from female sex workers and patients presenting to a gynecology clinic. Two patient isolates (2.2%) exhibited low-level resistance to metronidazole (50 µg/ml), and none were resistant to tinidazole.

A more recent report (1), designed to determine the prevalence of metronidazole-resistant T. vaginalis in a general population, studied 42 T. vaginalis isolates from adolescent females attending a primary care clinic in Atlanta, GA. Two isolates (4.8%) were metronidazole resistant (MLC of >50 µg/ml), and three (7.1%) were borderline resistant (MLC = 50 µg/ml).

The only other published data on metronidazole and tinidazole resistance among isolates of T. vaginalis are based on 104 clinical isolates sent to the CDC for testing between 1995 and 2001 because of suspected resistance on the basis of clinical failure. In this study, increased metronidazole resistance was correlated with increased tinidazole resistance; however, MLCs of tinidazole were significantly lower than MLCs of metronidazole (3).