Yersinia enterocolitica: A Frequent Seasonal Stool Isolate from Children at an Urban Hospital in the Southeast United States

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From 1 December 1988 through 28 February 1991, 7,290 rectal swab specimens received in our laboratory were screened for Yersinia enterocolitica. A total of 76 patients had Y. enterocolitica isolated from their stool samples. Of these patients, 59 (77.6%) were 12 months old or younger. Y. enterocolitica was second only to Salmonella spp. in this age group. Routine screening for Y. enterocolitica may be warranted in hospitals serving large pediatric populations.

Yersinia enterocolitica is a major cause of enteritis in much of the industrialized world (5). Enteritis due to this organism occurs primarily in infants and young children, and infections in the United States are reported to be more common in the North than in the South. Y. enterocolitica serogroup O:3, the most common serogroup in Europe, Japan, and Canada, was relatively rare in the United States until the 1980s (1). Recent reports indicate the emergence of serogroup O:3 in New York City and New York State (2, 3, 13) and in California (1). Serogroup O:3 surpassed serogroup O:8 as the most common Y. enterocolitica serogroup sent to the Yersinia Reference Laboratory, Centers for Disease Control (CDC) (9). Animals, especially swine, have been shown to serve as the reservoir for Y. enterocolitica serogroup O:3 (14). In the United States, consumption of contaminated food and milk products has been associated with outbreaks of other Y. enterocolitica (non-O:3) serogroups (9). In most sporadic cases, the source of infection remains obscure.

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From February 21 through April 21, 1980, 522 stool specimens were cultured for Y. enterocolitica. Specimens (usually two rectal swabs per culture) were submitted in transport media (Culturette; Marion Scientific Corp., Rockford, Ill.). Specimens were plated on MacConkey agar and incubated at room temperature for 48 h. No Y. enterocolitica was isolated from these specimens. From April 1980 through November 1988, stool specimens were screened for the presence of Yersinia spp. only if specifically requested by the physician.

An outbreak of Y. enterocolitica serogroup O:3 among black Atlanta children during the Thanksgiving-Christmas holidays in 1988 was associated with chitterling preparation (9). This precipitated our interest in another systematic survey for this pathogen in our patient population, which is urban, poor, and predominantly black.

All (7,290) rectal swab specimens, collected from inpatients and outpatients with a diagnosis of gastroenteritis and submitted for culture at Grady Memorial Hospital, Atlanta, Ga., from 1 December 1988 through 28 February 1991, were cultured for Salmonella, Shigella, and Campylobacter spp. by routine microbiologic procedures. Approximately 95% of patients had only one specimen submitted for culture. Media used were xylose-lysin-desoxycholate agar, Hektoen agar, Selenite broth, and Campylobacter-selective agar (CarrScarborough Microbiologicals, Stone Mountain, Ga.).

Specimens were screened for the presence of Y. enterocolitica by inoculating a cefsulodin-Irgasan-novobiocin (CIN) plate (Carr Scarborough and BBL Microbiology Systems, Cockeysville, Md.). CIN was incubated at room temperature (22 to 25°C) and inspected at 24 and 48 h for characteristic Y. enterocolitica colonies (solid red or red-centered colonies with transparent borders). Single suspect colonies were screened by touching a sterile wooden applicator stick to the colony and inoculating a Simmons citrate agar slant and a sheep blood agar plate (Carr-Scarborough). Usually only one suspect colony was picked from the CIN medium. If different morphologic colony types were present, then each type was tested. The citrate slant was incubated overnight at 35°C in air, and the blood agar plate was incubated at room temperature. Citrate-negative organisms (suspect Y. enterocolitica) were identified biochemically by either API 20E (Analytab Products, Plainview, N.Y.) or Vitek GNI (Vitek Systems, Hazelwood, Mo.) panels. If the Vitek GNI identified a species of Yersinia other than Y. enterocolitica, the organism was reevaluated with an API 20E panel. API panels were incubated at room temperature for 18 to 24 h.

All Y. enterocolitica strains isolated between 1 December 1988 and 30 November 1989 were forwarded to the Enteric Diseases Branch, Center for Infectious Diseases, CDC, for biochemical confirmation, serogrouping, and tests for in vitro markers of virulence that correlate with pathogenic serogroups. Markers of virulence tested were pyrazinamidase activity (7), esculin hydrolysis, and salcin fermentation (15). Isolates were also tested for calcium-dependent growth on Congo red-magnesium oxalate agar which correlates with the presence of a virulence plasmid (12). Isolates from December 1989 and January 1990 were serogrouped with O:3 antisera provided by the CDC for a multicenter study (10) and then forwarded to the CDC for confirmation and further testing. Yersinia isolates from 1 February 1990 through 28 February 1991 were not serogrouped or tested for in vitro virulence markers.

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TABLE 1. Isolation rates for *Y. enterocolitica* and other enteric pathogens from 7,290 rectal swab specimens submitted for culture at Grady Memorial Hospital, December 1988 through February 1991

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>No. of patients</th>
<th>No. of patients with pathogen (%)</th>
<th>Isolation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Y. enterocolitica</em></td>
<td>76</td>
<td>59 (77.6)</td>
<td>1.0</td>
</tr>
<tr>
<td>Pathogenic serogroup</td>
<td>35</td>
<td>27 (77.1)</td>
<td>1.0</td>
</tr>
<tr>
<td>Nonpathogenic serogroup</td>
<td>2</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Not tested</td>
<td>39</td>
<td>32 (82.0)</td>
<td>0.0</td>
</tr>
<tr>
<td><em>Salmonella</em> spp.</td>
<td>318</td>
<td>152 (47.8)</td>
<td>4.4</td>
</tr>
<tr>
<td><em>Shigella</em> spp.</td>
<td>192</td>
<td>18 (9.4)</td>
<td>2.6</td>
</tr>
<tr>
<td><em>Campylobacter</em> spp.</td>
<td>150</td>
<td>31 (20.7)</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>736</td>
<td>260 (35.3)</td>
<td>10.1</td>
</tr>
</tbody>
</table>

* Notes for columns:

- a Number of patients with pathogen divided by 7,290. Approximately 95% of patients had only one specimen submitted for culture.
- b Both *Salmonella* spp. and *Y. enterocolitica* isolated from two patients.
- c Congo red-magnesium oxide positive, pyrazinamidase negative, esculin negative, and salinicol negative.
- d Congo red-magnesium oxide negative, pyrazinamidase positive, esculin positive, and salinicol positive.
- e Not tested for in vitro markers of pathogenic serogroups.

*Y. enterocolitica* was isolated from 76 patients, which constitutes an isolation rate of about 1.0% of the 7,290 rectal swab specimens submitted for culture (Table 1). *Salmonella*, *Shigella*, and *Campylobacter* spp. were isolated more frequently than *Y. enterocolitica*. Most patients (74 of 76) from whom *Y. enterocolitica* was isolated were children. In children ≤12 months old, *Y. enterocolitica* was second in frequency only to *Salmonella* spp. (Table 1). Of the 76 patients from whom *Y. enterocolitica* was isolated, 15 (19.8%) were hospitalized because of the severity of their disease. Of these 15, 2 had concurrent bacteremia and 14 were ≤12 months old.

Seasonal differences in *Y. enterocolitica* isolation rates were seen. The winter months (December, January, and February) had the highest number of cases. The other seasons were fairly comparable in the number of cases identified, which ranged from four to nine.

There were 37 *Y. enterocolitica* strains isolated between 1 December 1988 and 30 January 1990. These isolates were referred to the CDC for further testing. Of these 37, 33 (89%) were serogroup O:3, 1 was O:1,2,3, 1 was O:5,2,7, and 2 did not react in sera to any pathogenic serogroups. The two isolates with nonpathogenic serogroups did not exhibit in vitro markers of virulence. The 35 virulent *Y. enterocolitica* isolates were all from children, and 28 of the 35 (80%) were from children who were 12 months old or less.

Cases of *Y. enterocolitica* occurred throughout the year in our patient population and increased in the winter months. This contrasts with data from Canada which indicated highest isolation rates in the summer (11). The *Y. enterocolitica* isolates from the Canadian study were predominantly serogroup O:3, as were ours.

Data from this *Y. enterocolitica* survey in Atlanta agreed closely with data from the state of New York (8). Neither study showed a summer peak for *Y. enterocolitica* isolation; in both, the highest frequency for *Y. enterocolitica* was in children 1 year old or less.

The association between chitterling preparation during the Thanksgiving-Christmas holiday period and cases of *Y. enterocolitica* infection has been emphasized during the study period (9, 10). Despite efforts to educate the public about the need for careful preparation of chitterlings (4), cases again increased during the Thanksgiving-Christmas holiday season in both 1990 and 1991. Further public health intervention, as well as further study of food sources and modes of transmission of *Y. enterocolitica*, may be necessary.

A prior study concluded that routine screening for *Y. enterocolitica* on CIN agar was not a cost-effective procedure in that patient population (6). By contrast, our data suggest that routine screening for *Y. enterocolitica* is warranted at certain hospitals, especially of children ≤1 year of age. We suggest that institutions with large pediatric populations, regardless of their geographic locations, assess the need for routine screening for *Y. enterocolitica*.

REFERENCES


