Escherichia coli Gastro-enteritis in Adults

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SUMMARY
Two cases of gastro-enteritis in South African adults are reported. Stool cultures performed on both patients yielded pure growths of Escherichia coli. One isolate was shown to have invasive ability, and the other to produce heat-stable enterotoxin. Neither strain belonged to a 'classic' enteropathogenic serotype associated with infantile gastro-enteritis.


For almost 30 years Escherichia coli has been recognized as a cause of gastro-enteritis in children under 2 years of age. More recently a number of reports of diarrhoea in adults caused by E. coli have been published. These observations have followed the elucidation of the pathogenesis of E. coli gastro-enteritis. Research has indicated that E. coli may produce diarrhoea by one of two mechanisms. These are direct invasion of the bowel mucosa to produce Shigella-like dysentery, or production of enterotoxin, which leads to a cholera-like illness. We report here 2 cases of gastro-enteritis in adults from whom invasive and enterotoxigenic E. coli respectively were the only pathogens recovered.

PATIENTS AND METHODS

Patient 1
A 20-year-old Black male mineworker was discovered to be a carrier of Shigella sonnei on routine stool examination. He was treated with oral neomycin for 3 days. Two weeks later he developed a watery diarrhoea with mild abdominal cramps. Microscopical examination of stool revealed a few polymorphonuclear leucocytes but no parasites. Routine aerobic culture of stool yielded a pure growth of a non-lactose fermenting strain of E. coli 0124 K? H30.

Patient 2
A 32-year-old White woman presented with mucous diarrhoea, nausea, marked cramps, fever and chills. Stool examination revealed a large number of inflamatory cells and a few erythrocytes. No parasites were noted. Stool culture yielded a pure growth of E. coli 0148 K? H28. The patient was treated by her private physician with an oral sulphonamide and streptomycin preparation and metronidazole, in addition to symptomatic therapy.

Methods
Four bacterial colonies from each patient were selected and examined for enteropathogenic potential, as described previously. Invasive ability was tested for by means of the guinea pig keratoconjunctivitis test (Serény). For the demonstration of enterotoxins, bacteria were cultured at 37°C overnight in casamino acid-yeast extract medium with shaking at 180 rpm. The cultures were centrifuged to sediment the bacteria, and the supernatants filtered through Millipore membranes (pore size 0.22 μm). Filtrates were examined for enterotoxigenicity in suckling mice and Chinese hamster ovary tissue culture. These models detect the heat-stable and heat-labile enterotoxins of E. coli respectively.

RESULTS

Aerobic culture of stool specimens from both patients yielded a pure growth of E. coli. The strain recovered from patient 1 was negative in the suckling mouse and Chinese hamster ovary assays, but produced marked keratoconjunctivitis in the Serény test. The E. coli strain from patient 2 was negative in tests for invasion and heat-labile enterotoxin, but was positive in the suckling mouse assay. In 6 separate experiments performed in triplicate a gut weight to total body weight ratio of 0.098 ± 0.02 (SD) was obtained. The activity of the culture filtrates in this test was unaffected by boiling for 10 minutes. The results of the tests for enteropathogenicity of the 2 isolates are summarized in Table I.

DISCUSSION

The enteropathogenicity of E. coli for adults has been clearly established. In a prospective study enterotoxigenic E. coli was shown to be responsible for diarrhoea in travellers to Mexico. In another series of investigations, an outbreak of diarrhoeal disease in America was traced to imported French cheese contaminated with an invasive strain of E. coli. Curiously, the latter strain shared a number of properties with that recovered from patient 1. In addition to being invasive, both were late lactose positive for O124, O148 serotypes.

TABLE I. RESULTS OF TESTS FOR ENTEROPATHOGENICITY OF E. COLI STRAINS RECOVERED FROM 2 ADULTS WITH GASTRO-ENTERITIS

<table>
<thead>
<tr>
<th>Test</th>
<th>Patient 1</th>
<th>Patient 2</th>
</tr>
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<tbody>
<tr>
<td>E. coli serotype</td>
<td>O124 K? H30</td>
<td>O148 K? H28</td>
</tr>
<tr>
<td>Heat-labile enterotoxin</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heat-stable enterotoxin</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Invasiveness</td>
<td>+</td>
<td>-</td>
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fermenters and belonged to the same serotype. Furthermore, both were associated with diarrhoea more watery than that usually attributed to an invasive pathogen. The source of the *E. coli* in our patient is obscure. He denied having eaten imported cheese or any other imported food. No further cases have been reported from the mine where he was employed and accommodated.

The disease in patient 2 also appeared to be sporadic. She takes all her meals at home or at the staff canteen at her place of employment. No other cases of diarrhoea have been reported from either location.

We have not been routinely examining bacteria from adults with gastro-enteritis for invasive and toxigenic properties and are therefore unable to comment on their prevalence. We believe, however, that they probably account for many more cases of diarrhoea than has previously been recognized. Earlier published work on *E. coli* gastro-enteritis in adults has tended to rely heavily on epidemiological data in order to establish its aetiology. Consequently, these studies have emphasized the epidemic nature of these infections. We believe that there is now sufficient evidence to indicate the occurrence of sporadic cases of *E. coli* gastro-enteritis. The 2 patients reported here demonstrate this. In both, *E. coli* was isolated from the stool in pure culture, and each strain was subsequently shown to possess a property clearly linked with enteropathogenicity. It is suggested that other laboratories undertake similar investigations in cases of obscure diarrhoea where *E. coli* is the only potential pathogen recovered from the stool.

Although one of the patients reported here (patient 2) recovered uneventfully after the administration of anti-diarrhoeal and antimicrobial agents, we believe that generally such therapy should be withheld, since there is little evidence that antimicrobial therapy significantly shortens the duration of the symptoms caused by other enteropathogens. Moreover, certain anti-diarrhoeal preparations may prolong the period of excretion of the bacteria during convalescence.

Neither *E. coli* serotype reported here is a 'classic' enteropathogenic serotype associated with infantile gastro-enteritis. This observation endorses the opinion expressed by other workers that the value of serotyping as the only test for enteropathogenicity of *E. coli* is severely limited.

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REFERENCES