Prevalence of *Campylobacter fetus* subsp. *jejuni* in Healthy Populations in Southern India

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*Campylobacter fetus* subsp. *jejuni* was isolated from the feces of 14.8% of a random sample of the healthy population of rural southern India. The rate of isolation was highest in preschool children. This finding emphasizes the need to identify markers of pathogenicity in strains of *C. fetus* subsp. *jejuni*, which so far are identified only by cultural characteristics. The pathogenic role of this organism in patients with diarrhoea in tropical developing countries can be understood when such markers of pathogenicity are found.

The recognition of organisms belonging to the *Campylobacter* group as important pathogens causing acute diarrheal illness was an exciting development in enteric microbiology during the latter half of the 1970s (9). *Campylobacter fetus* subsp. *jejuni* has been isolated from patients with diarrhea and abdominal cramps in temperate countries (4, 6, 14–17) and also in a few instances in tropical regions (8, 10). However, the difficulties inherent in its culture (9) have thus far prevented systematic studies of the epidemiology of this organism as a pathogen in tropical developing countries where acute diarrhoea is of great public health importance. This paper reports the high prevalence (14.8%) of *C. fetus* subsp. *jejuni* in feces from a stratified random sample of a southern Indian rural community studied as a preliminary to a detailed study of hospitalized children with acute diarrhoea.

MATERIALS AND METHODS

Sixty-eight families (305 individuals) were randomly selected from 379 families in a village 20 km south of Vellore after stratification based on family income. The incidence of episodes of acute diarrhoea was recorded. Stool samples were collected at least 6 weeks after the last known episode of diarrhoea. None of the subjects developed diarrhoea during the 2 weeks after the stool sample was collected. Starting with the second week of November 1980, freshly passed stool specimens were obtained from at least two families each day two or three times a week. The samples were collected in sterile plastic containers which were transported on ice to the laboratory within 1 h of collection. The sampling was completed by late February 1981.

Laboratory methodology. In general all samples were processed as soon as they were received in the laboratory. If there was any delay (maximum 1 h), the samples were kept at 4°C. Stool samples were directly plated on to Butzler medium (thioglycolate agar with 10% sheep blood and 25 IU of bacitracin per ml, 5 μg of novobiocin per ml, 50 μg of cyclohexamide per ml, 10 units of colistin per ml, and 15 μg of cephalozin per ml). Earlier experience with a strain of *C. fetus* subsp. *jejuni* (supplied by T. W. Steel of Australia, IMVS 1247) had shown that with this medium the organisms could be recovered when added to fresh feces at a concentration of 30 g of feces. All plates were incubated at 42°C in an anaerobic jar filled with 5 to 10% carbon dioxide and 85 to 95% nitrogen after a single evacuation (9). A plate with the control strain was also included with each set of inoculated plates to ensure that conditions for the adequate recovery of *Campylobacter* samples were met. The plates were read at 48 and 72 h, and characteristic colonies were recognized by their morphology. These were further identified by Gram stain, motility, oxidase and catalase production, growth at 37 and 42°C with no growth at 25°C in brucella broth, no growth in 3.5% sodium chloride, growth in 1% glycine, hydrogen sulfide production in cysteine hydrochloride medium with lead acetate paper, sensitivity to nalidixic acid, and growth on triphenyl tetrazolium chloride agar (3).

All stool samples were also inoculated into MacConkey agar, deoxycholate citrate agar, xylose lysine deoxycholate agar, and selenite broth which was subcultured onto salmonella-shigella agar (Difco Laboratories, Detroit, Mich.) plates after overnight incubation to isolate other enteric pathogens. All pathogens were identified by standard bacteriological methods (11). In addition, approximately 15 lactose-fermenting colonies from MacConkey agar plates were screened for enteropathogenic serotypes by slide agglutination.

RESULTS

*C. fetus* subsp. *jejuni* was isolated from 45 of the 305 stools (14.8%) from the stratified random sample of the healthy rural population (Table 1). The rate of isolation was highest in preschool children (under 5 years old, 37.0%). The rate of isolation in children under 2 years of age was not higher than that in older preschool children. The organism was also isolated from all older age groups but with lower frequency. The frequency of isolation of *Campylobacter* cultures each
month was similar during the 4 months of the study. In five of the families the organism was isolated from more than one individual. A follow-up of these families showed that individuals initially excreting the organism had negative specimens 10 or more days later.

From 55 of the subjects, including 10 from whom Campylobacter organisms were cultured, 60 isolates of other enteropathogenic bacteria were obtained (36 enteropathogenic serotypes of E. coli, 5 Shigellae, 4 Salmonellae, and 15 other isolates. In 11 subjects, two organisms and in 2 subjects, three organisms could be cultured.

**DISCUSSION**

The high rate of isolation of C. fetus subsp. jejuni from the feces of healthy individuals is similar to the reported isolation of other recognized enteric pathogens in tropical developing countries (1, 2, 12, 13). Campylobacter cultures have been infrequently isolated from healthy subjects in temperate countries (9). Our findings (i.e., the isolation of Campylobacter cultures from more than one individual in several families and the presence of more than one pathogen in the feces at the same time) suggest that environmental factors are important in influencing the prevalence of these organisms.

In tropical developing countries, Campylobacter cultures have been isolated from 9% of the children with measles in Central Africa (10), 44% of the black children between 9 and 24 months of age in South Africa (7) and 17.7% of 141 children between 12 and 65 months of age in Bangladesh (5). In the latter study, 40% of the stool samples from children under 2 years old contained Campylobacter cultures, and the rate of isolation from children who had a history of diarrhoea during the preceding month was high.

Campylobacter organisms were not cultured from healthy adults, although it was cultured from the stools of patients of all ages with diarrhoea in Bangladesh (5).

Reports from temperate zones mainly deal with fecal samples obtained from patients, and it has been assumed that C. fetus subsp. jejuni, identified primarily by cultural characteristics, is invariably an intestinal pathogen, although the mechanism of pathogenicity or host susceptibility factors are not known. A method of identifying markers of pathogenicity in organisms identified as C. fetus subsp. jejuni on the basis of cultural characteristics has to be developed before a pathogenic role can be ascribed to such isolates in tropical countries. This knowledge is necessary to understand the role of Campylobacter organisms in acute diarrhoeal diseases, a problem of considerable public health importance in tropical developing countries, and to determine the dynamics of enteric infections in the community so that adequate control measures can be devised.

**ACKNOWLEDGMENT**

The work of the Wellcome Research Unit is supported by the Wellcome Trust, London.

**LITERATURE CITED**


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**TABLE 1. Rate of isolation of C. fetus subsp. jejuni and other pathogens (including EPEC*) from a random sample of the southern Indian rural population**

<table>
<thead>
<tr>
<th>Age group (yr)</th>
<th>Total no. sampled</th>
<th>C. fetus subsp. jejuni</th>
<th>Other pathogens (including EPEC*)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>0–4.9</td>
<td>54</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>5–11.9</td>
<td>71</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>12–17.9</td>
<td>37</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>18+</td>
<td>143</td>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>305</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>0–1.9</td>
<td>30</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>

* EPEC, Enteropathogenic Escherichia coli.


