

## SPECIES AND SEROVARS OF ENTEROPATHOGENIC AGENTS ASSOCIATED WITH ACUTE DIARRHEAL DISEASE IN ROSARIO, ARGENTINA.

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### SUMMARY

We report the most frequent species and serovars of enteropathogenic organisms in Rosario from 1985 to 1993. Enteropathogenic *Escherichia coli* was the most prevalent agent affecting 144/570 (25.2%) children; 0111 represented 41.8%, 055: 13.6%, 0119: 12.7%. Among enterotoxigenic *E. coli* (ETEC) the most frequent were ETEC-ST 0128:H21 and 0153:H45. *Shigella* spp were isolated in 8.8%; *S. flexneri*: 7%, principally type 2 (59.5%); *S. sonnei*: 1.6%, and *S. dysenteriae* type 2: 0.2%. *Campylobacter* spp were found in 6.1% of patients; *C. jejuni*: 4.6%; *C. coli*: 1.4% and *C. lari*: 0.2%; except groups 0 13,50 and 0 4 (2 cases each), no predominant serogroups were found. *Salmonella* was isolated in 2.8% of cases, being the predominant serovar *S. typhimurium* until 1986, but a dramatically increase of cases due to *S. enteritidis* was observed since 1987. There was 1.9% of *Aeromonas* spp and 2 cases due to *Vibrio cholerae* non 0-1. No *Yersinia* was found. In patients with gastroenteritis due to *Shigella*, *Campylobacter*, *Salmonella*, or EPEC as the unique pathogen, leukocytes were observed in the faeces in 70%, 50%, 20%, and 10% of cases respectively.

**KEYWORDS:** Acute diarrhea; Enteropathogenic agents-species; Serovars; Rosario, Argentina.

### INTRODUCTION

Infectious diarrhea is an important worldwide problem<sup>14</sup>, with distinct etiological and epidemiological characteristics in different countries<sup>4, 11, 13</sup>. Rotavirus is the most commonly detected etiologic agent in infants with diarrheal disease in developed countries, in which there are a few cases due to *Escherichia coli*<sup>4</sup>. In contrast, enteropathogenic *E. coli* (EPEC) is a major cause of diarrhea in developing countries of South América, as well as other bacterial agents<sup>7, 11, 13</sup>. We have noted some differences in the distribution of the isolates in cases of acute diarrhea not only in different countries but also in several areas of our own country. In the present note we report the most frequent species and serovars of enteropathogenic organisms in Rosario.

### MATERIAL AND METHODS

We analyse results of a study carried out in 570 children under 5 years of age with acute diarrheal disease from September 1985 to September 1990, which has been partially published<sup>7</sup>. Stool samples or rectal swabs were inoculated on media for *Salmonella*, *Shigella*, *Escherichia coli*, *Campylobacter*, *Vibrio*, *Aeromonas*, and *Yersinia*. LT and ST *E. coli* enterotoxins were investigated as previously described<sup>7</sup>, by N. BINSZTEIN and M. RIVAS, Instituto Nacional de Microbiología, Buenos Aires, Argentina. Enterotoxigenic *E. coli* (ETEC) was serotyped by I. and F. ORSKOV at the International *Escherichia* and *Klebsiella* Centre, Statens Seruminstitut, Copenhagen, Denmark. *Campylobacter* was serotyped by J. L. PENNER at the Department of

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Medical Microbiology, Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada, by the passive hemagglutination method <sup>10</sup>.

## RESULTS

Enteropathogenic *E. coli* (EPEC) was isolated from 144 (25.2%) of children studied; among 110 isolates, the major O serogroups were 0111: 46 (41.8%), 055: 15 (13.6%), 0119: 14 (12.7%), 026: 6 (5.4%), 0128: 6 (5.4%). ETEC was isolated from 60 (10.6%) of children with diarrhea. The most frequent serogroups among 25 strains typified were ETEC ST 0128: 10 (40%), 0153: 4 (16%), 078: 3 (12%), and 020: 2 (8%).

*Shigella* spp was the 3rd in frequency affecting 50 (8.8%) of the patients with the distribution as follows: *S. flexneri*: 40 (80%); *S. sonnei*: 9 (18%); and *S. dysenteriae* type 2: 1. Since 1970 *S. boydii* was not detected in Rosario. The serotypes of *S. flexneri* were: type 1: 3 (7.5%), type 2: 24 (60.0%), type 3: 7 (17.5%), type 4: 2 (5%), and type 6: 4 (10%).

*Campylobacter* spp was isolated in 35 cases (6.1%); *C. jejuni* 26 (74.3%), *C. coli* 8 (22.8%), and *C. lari* 1.

*Aeromonas* was identified in 11 children (1.9%); 6 cases were due to *A. hydrophila*, 3 cases to *A. caviae*, and 2 cases to *A. sobria*.

Two patients had a severe gastroenteritis due to *V. cholerae* non 0-1. *Salmonella* was isolated in 2.9% of cases, being the predominant serovar *S. enteritidis*. In patients with gastroenteritis due to *Shigella*, *Campylobacter*, *Salmonella* or EPEC, as the unique pathogen, polymorphonuclear leukocytes were observed in faeces in 70%, 50%, 20%, and 10% of cases respectively.

## DISCUSSION

The most commonly detected enteropathogens in infants with diarrhea were *E. coli* of EPEC serogroups, which affected about a 25% of them. EPEC are at present uncommon in developed countries while its incidence is important in South America <sup>7, 11, 13</sup>, and particularly in Argentina where the major classic EPEC serogroup 0111, 055, and 0119 are frequent.

ETEC was the second cause of diarrhea. It is an important etiological factor in South America <sup>11, 13</sup>, and was found in about 11% of our cases, with a particular distribution of serotypes. ETEC ST were the most fre-

**TABLE 1**  
Prevalence of enteropathogens in the stools of 570 infants with acute diarrhea, Rosario, Argentina.

Enteropathogen *	N <sup>o</sup> (%)
EPEC serogroup	144 (25.2)
ETEC	60 (10.6)
ST	34 (6.0)
LT	21 (3.7)
ST/LT	5 (0.9)
<i>Shigella</i> species	50 (8.8)
<i>S. flexneri</i>	40 (7.0)
<i>S. sonnei</i>	9 (1.6)
<i>S. dysenteriae</i>	1 (0.2)
<i>Campylobacter</i>	35 (6.1)
<i>C. jejuni</i>	26 (4.6)
<i>C. coli</i>	8 (1.4)
<i>C. lari</i>	1 (0.2)
<i>Salmonella</i>	16 (2.8)
<i>S. typhimurium</i>	4 (0.7)
<i>S. enteritidis</i>	5 (0.9)
<i>S. newport</i>	2 (0.3)
other	5 (0.9)
<i>Aeromonas</i>	11 (1.9)
<i>A. hydrophila</i>	6 (1.0)
<i>A. caviae</i>	3 (0.5)
<i>A. sobria</i>	2 (0.3)
<i>Vibrio cholerae</i> no 01	2 (0.3)

NOTE. EPEC=enteropathogenic *Escherichia coli*. ETEC=enterotoxigenic *E. coli*. LT = heat labile enterotoxin.

ST = heat stable enterotoxin.

\* *Yersinia enterocolytica* was not detected

quent among young children and were distributed in a small number of serogroups; 13 out of 18 Argentine isolates of ETEC ST/LT were of group 06; 76% of the ETEC ST were of four serogroups (020, 078, 0128, and 0153); 11 out of 14 Argentine isolates of serotype 0128 H21 were found in Rosario <sup>1</sup>. ETEC serotype 0153:H45 was often isolated in Argentina as well as in Chile and Spain <sup>2</sup>.

*S. flexneri* was the most frequent species of the genus *Shigella*, being *S. flexneri* type 2 the most important. There were three cases due to *S. dysenteriae* type 2 reported in Rosario <sup>9</sup>. Since 1970 *S. boydii* was not detected in Rosario.

*Campylobacter* spp were isolated in our city in 3.2-6.2% of the cases <sup>5, 7</sup>. They caused enteritis more frequently than *Salmonella*. *C. jejuni* biotype 1 was the most usually isolated. There was 1 case due to *C. lari*. No predominant serogroup was observed, except 2 cases due to serogroup 04, and 2 cases due to serogroup 13/50 <sup>8</sup>.

*Salmonella* was isolated in about 3% of the children with diarrhea. Since 1970 until 1983 the most common serovar was *S. typhimurium* var Copenhagen

(1, 4, 12: i-1, 2). Either among adults and children a dramatic increase of cases due to *S. enteritidis* was observed since 1987. This serovar has been the etiological agent of footborne disease chiefly related to ingestion of eggs and mayonnaise<sup>3</sup>. Among 291 strains isolated in Rosario from 1982 to 1992 *S. enteritidis* was isolated in 198 cases, and *S. typhimurium* in 41 cases. The other 52 serovars were *S. derby*, *S. newport*, *S. infantis*, *S. agona*, *S. anatum*, *S. heidelberg*, *S. mbandaka*, *S. panama*, *S. hadar*, *S. oraniemburg*, *S. cholerasuis*, *S. senftenfer*, *S. meleagridis*, *S. chester*, and *S. monteideo*.

In Rosario, at the bank of the river Paraná, *Aeromonas* was encountered in 2% of the cases. A few cases of severe diarrhea due to *Vibrio cholerae* no 01 were reported<sup>6</sup>. No *Yersinia* spp were found.

It is important to know the epidemiological local data, in order to outline a prophylactic plan against enteric diseases.

## RESUMO

### Espécies e serovariantes de agentes enteropatogênicos associados com diarreia aguda em Rosario, Argentina.

Apresentamos as espécies e serovars mais frequentes dos microorganismos enteropatogênicos entre 1985 e 1990 em Rosario. *Escherichia coli* enteropatogênica (EPEC) foi a que predominou, afetando 144/570 (25,2%) crianças; 0111 representou 41,8%, 055 13,6%, 0119 12,7%. Entre as *E. coli* enterotoxigênicas (ETEC), ETEC-ST 0128:H21 e 0153:H45 foram as mais frequentes. Entre os 570 pacientes, *Shigella* spp. foi diagnosticada em 50 (8,8%); *S. flexneri* 7%, principalmente do tipo 2 (59,5%), *S. sonnei* 1,6% e *S. dysenteriae* tipo 2 (1%). Foram encontrados *Campylobacter* spp em 6,1% dos pacientes; *C. jejuni* 4,6%, *C. coli* 1,4% e *C. lari* 0,2%; exceto os grupos 0 13/50 e 0 4 (dois de cada um), não foram encontrados serogrupos predominantes.

*Salmonella* foi encontrada em 2,8% dos casos, sendo o serovar *S. typhimurium* o predominante até 1986, mas desde 1987, foi observado um aumento importante de casos por *S. enteritidis*. Houve 1,9% de *Aeromonas* spp e dois casos por *Vibrio cholerae* não 01. Não se encontrou *Yersinia* spp. Nos pacientes com gastroenteritis por *Shigella*, *Campylobacter*, *Salmonella* e EPEC como único patógeno, foram observados leucocitos nas fezes de 70%, 50%, 20% e 10% dos casos respectivamente.

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Recebido para publicação em 19/10/1994.

Aceito para publicação em 09/02/1996.