

Etiology of Pediatric Diarrhea at Children's Hospital, Bangkok

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OBJECTIVE : To determine the etiology of diarrhea in children seen at Children's Hospital.

BACKGROUND : Enteric infections are a serious cause of morbidity and mortality in developing, tropical countries. *Salmonella*, *Shigella* and *Vibrio* have previously been recognized as etiologic agents. Recently, rotavirus and enterotoxigenic *E. coli* have been recognized as important pathogens in pediatric diarrhea in the tropics (1-3). Still more recently, *Yersinia enterocolitica* (4) and *Campylobacter* (5) have been implicated in a large proportion of enteric disease. Little is known of the relative significance of those pathogens in Bangkok. Enteroviruses also may cause sporadic outbreaks of diarrheal in pediatric populations (6).

MATERIALS AND METHODS : One hundred children with diarrhea and 100 controls without gastrointestinal disease were studied. Stools and urine were collected from children in both groups. Clinical histories were obtained at the time of specimen collection.

Bacteria in the stool specimens were isolated and identified by standard techniques (7). Chemical biotyping of the Enterobacteriaceae was performed using the Analytab Enteric (API-20E) system (8, 9). Principal organisms of interest were : *Salmonella* sp., *Shigella* sp., *Vibrio* sp., *Campylobacter* sp., *Y. enterocolitica* and *E. coli*. The prevalence of other bacteria including *Plesiomonas* sp., *Aeromonas hydrophilia* and *Shigelloides* was also determined. Serological confirmation of *Salmonella*, *Shigella* and *Vibrio* species was made using commercial antisera and procedure as was serotyping of *E. coli* (DIFCO, Detroit, Mich.).

Enterotoxigenic *E. coli* heat-labile toxin (LT) identification was made in the Y1 adrenal cell assay (10, 11) and heat-stable toxin (ST) in the suckling mouse assay (12, 13). Rotavirus detection was performed by the enzyme-linked immunosorbent assay of Ghose (14). Enteroviruses were isolated from stool specimens by standard tissue culture diagnostic techniques (15).

Urine specimens were screened for antibiotics.

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Paired sera were collected from the patient group with diarrhea for future assessment of antibody rise to LT by microtiter adrenal tissue culture technique and to SA-11 simian virus by complement fixation and enzyme-linked immunosorbent assay procedures.

RESULTS

1. The characteristics of the children with diarrhea and well controls are listed in Table I.

2. Bacterial enteropathogens isolated are listed in Table II.

3. Enterotoxigenic *E. coli* isolates are listed in Table III. Enterotoxigenic *E. coli* were isolated from 22/100 (22%) of children with diarrhea and 10/100 (10%) of well children.

4. Rotavirus was detected by ELISA technique in 27/92 (29%) of children with diarrhea and 2/96 (2%) of well children*.

5. Twenty-nine percent (29/100) children with diarrhea and fifty-three percent (22/41) of children without diarrhea had antibiotics detectable in their urine. There was no correlation between the history of taking or not taking antibiotics and the presence of antimicrobial agents in the urine.

6. Enteroviruses were isolated from 8/33 (24%) of children with diarrhea and 3/19 (16%) of controls.

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* 2/96 were +; 6/96 were + and need to be blocked (8/96) = 8%

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Table I

<u>Children with Diarrhea</u>		<u>Well Children</u>
<u>Age</u>		
Mean	1 11/12 years	1 9/12 years
Range	1/12 - 5 years	1/12 - 5 years
<u>Sex</u>		
Males	67	51
Females	33	49
<u>Duration of Diarrhea</u>		
Mean	44 hours	4% (4/89) had diarrhea
Range	2 - 72 hours	in preceding two weeks
<u>Number of Stools within 24 hours</u>		
< 5	41	-
< 10	46	-
< 15	9	-
Not Recorded	4	-
<u>Vomiting</u>		
Yes	88	-
No	12	-
<u>URI</u>		
Yes	16	-
No	84	-
<u>Rash</u>		
Yes	1	-
No	99	-
<u>IV hydration</u>		
Yes	98	-
No	2	-
<u>Character of Stool</u>		
Water	59	-
Mucous	36	-
Blood	5	-
<u>Temperature</u>		
< 38°C	60	-
38 - 39.9°C	35	-
≥ 40°C	3	-

Table II. Bacterial Enteropathogens Isolated

<u>Isolate</u>	<u>Diarrhea</u>	<u>No Diarrhea</u>
<u>NAG Group I</u>	2	0
<i>V. cholerae</i>	2	0
<i>Salmonella</i> Group B	3	0
Group E	1	0
Group E ₂	1	0
Group E ₄	2	0
<i>Shigella</i>	9	1
Dysenteriae	0	0
Flexneri	7	0
Sonnei	1	1
Boydii	1	1
<i>Yersinia enterocolitica</i>	0	1
<i>Campylobacter</i>	4	2
<i>Aeromonas hydrophila</i>	11	10
<i>Plesiomonas shigelloides</i>	4	2
<u>EPEC</u>	18	21
02:K56	1	1
018a 018c:K77	3	3
020a 020b:K61	2	2
044:K74	0	1
055:K59	3	1
086a:K61	0	1
0111:K58	3	2
0112:K66	1	0
0113:K75	0	2
0124:K77	1	0
0125:K70	0	2
0126	2	4
0127:K63	1	1
0128:K67	1	1

Table III. Enterotoxigenic *E. coli*

Children with Diarrhea

	LT-ST	LT	ST	Total
5A ^Δ	0	1	0	1
7A [○]	0	5	0	5
8A	0	7	0	7
14A	0	1	0	1
20A	3	4	2	9
30A	0	8	0	8
33A	0	10	0	10
34A	10	0	0	10
35A	0	4	0	4
45A	0	7	0	7
46A	3	6	0	9
57A	0	0	10	10
61A	0	5	0	5
62A ⁺	0	4	0	4
65A	0	2	0	2
66A	10	0	0	10
24A	10	0	0	10
76A*	0	4	0	4
78A	0	0	10	10
86A	0	0	10	10
91A	9	1	0	10
93A	1	0	0	1

Δ One *E. coli* 020a 020b:K61 isolated non-toxigenic

○ Five *E. coli* 0128:K67 isolated non-toxigenic

+ Two *E. coli* 0111:K58 isolated non-toxigenic

* Two isolates included in EPEC serotypes 018a 018c:K77

Controls

	LT-ST	LT	ST	Total
7C	1	0	0	1
14C	8	0	0	8
26C	0	8	0	8
28C	0	0	7	7
29C	0	0	4	4
30C	0	8	0	8
40C	0	3	0	3
42C	0	7	0	7
52C	9	1	0	10
82C	0	2	0	2
94A	10	0	0	10
95A	0	1	0	1

None of toxigenic isolates from controls of serotypes included in EPEC pools.