

Bacterial Enteric Flora in Children with Acute Enteritis Compared to a Healthy Control Group During Summer

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Infantile and childhood diarrhea associated with secondary infections and malnutrition is still a great problem in Turkey, as in the other developing countries. A high incidence of diarrhea during the summer season from May to September between the ages of 24 months and 6 years usually occurs in children with malnutrition coming from poor families.

In our country very few investigations have been carried out on bacterial enteric flora in healthy children with acute enteritis.

The following study was done between May 1972 and September 1972 and aims at comparing intestinal bacterial flora in children who have acute enteritis with that of a similar group of healthy children.

Materials and Methods

392 children who were selected among cases of enteritis in the out-patient clinic of Hacettepe University Hospital were all younger than 12 years of age. The control group consisted of 111 children selected from Well-Baby Out-Patient Clinic, none of whom had shown any acute disease of the intestinal tract at least 4 weeks before the study.

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A physical examination was performed for each child. Any doubts of parenteral enteritis were eliminated. Stool specimens were taken with the help of cotton-tipped rectal swabs and were placed in glass tubes containing 3 ml of bouillon and were immediately sent to the Microbiology Laboratory where they were inoculated on stool bacteriologic media (SS agar and selenit-F media) which were incubated at 37°C. After 18 to 24 hours of incubation at this temperature, the plates were studied and subcultured to EMB and SS agar from selenit-F media. Suspected colonies on the plates were inoculated into TSI, and other media such as sugar, indol and urease, for additional investigation. The agglutination tests were done by using polyvalent diagnostic sera for determining the type of bacteria on shigella, salmonella or pathogenic *E. coli* strains.

After identification of bacteria, the antibiotic sensitivity test was carried out by using Bauer-Kirby disc method.² We employed streptomycin (10 mcgr), chloramphenicol (30 mcgr), tetracycline (30 mcgr), gantrisin (300 mcgr), ampicillin trihydrate (10 u), Trimethoprim-sulphamethoxazole (25 mcgr), neomycin (30 mcgr), kanamycin (30 mcgr), gentamycin (15 mcgr), colimycin (10 mcgr), keflin (30 mcgr), thiamphenicol (30 mcgr), disc and agar media for antibiotic sensitivity tests.

Results

The various bacterium isolated in a total of 503 cultures performed on pediatric and nursery patients ranging in ages from less than 7 days to 12 years during the summer months of 1972 are shown in Table I and II, respectively.

TABLE I
MICROORGANISMS ISOLATED IN CHILDREN WITH ENTERITIS

Period	Number of Patients	Diar- rhea	Shige- lla	Percent- age	Etp. E. Coli	Percent- age	S. Para B.	Percent- age
May	30	+	2	6.6%	0	0	1	3.3%
June	48	+	9	18.7%	0	0	0	0
July	125	+	20	16 %	4	3.2%	1	0.8%
August	140	+	12	8.5%	2	1.4%	0	0
September	49	+	9	18.4%	0	0	1	2
Total		Total		Total		Total		
392		52		6		3		

TABLE II
MICROORGANISMS ISOLATED IN CONTROL GROUP

Period	Number of Patients	Shi- gella	Percent- age	Etp. E. Coli	Percent- age	S. Para B.	Diar- rhea
May	10	0	0	0	0	0	—
June	20	1	5%	0	0	0	—
July	40	3	7.5%	0	0	0	—
August	20	1	5%	0	0	0	—
September	21	0	0	3	4.7%	0	—
Total		Total	Total				
111		5	3				

In July, August, and in September two *E. coli* types (O 111 B 4 and O 55 B 5) were isolated from specimens of six cases with diarrhea, and 3 from specimens of the control patients. There were no positive urine or blood cultures in control cases. Three *Salmonella paratyphi B* were isolated from 392 patients with diarrhea. Fifty two *Shigella* were isolated from cultures of cases in 392 patients with diarrhea, *Shigella flexne'ri* culture was isolated in 34, *Shigella sonnei* in 17, and *Shigella boy'dii* in 1 (See Table III).

TABLE III
TYPE OF SHIGELLA STRAINS

Number of Total Specimens	392	Percentage
Total <i>Shigella</i>	52	13.2%
<i>Sh. flexne'ri</i>	34	65.3%
<i>Sh. sonnei</i>	17	32.6%
<i>Sh. boy'dii</i>	1	1.9%

No significant sensitivity difference was observed among various types of *Shigella*.

Enteropathogenic *E. coli* was isolated only in 3 (14.2 %) control cases in the month of September.

In patients with diarrhea, enteropathogenic *E. coli* was isolated in 4 (3.2 percent) patients in July, and 2 (1.42 %) in August. No positive urine or blood cultures were observed in these infants. In control cases, *Shigella* positive was found in one culture in June (1 %) 3 in July (7.5 %), and 1 in August (5 %).

TABLE IV
ANTIBIOTIC SENSITIVITY TEST RESULTS OF SHIGELLA STRAINS

Antibiotic	Sensitive (%)	Resistance (%)
Keflin	100	0
Colistin	100	0
Gentamycin	100	0
Thiamphenicol	100	0
Kanamycin	100	0
Neomycin	100	0
Tetracycline	78	22
Chloramphenicol	80	2
Ampicillin Trihydrate	93	7
Streptomycin	30	70
Gantrisin	25	75
Trimetoprim-Sulfamethoxazole	98	2

In diarrheal cases, *Shigella* was isolated in 2 cases (6.6 %) in May, 9 (18.7 %) in June, 20 (16 %) in July, 12 (8.5 %) in August and 9 (18.4 %) in September.

Discussion

Dysentery cases due to strains of *Shigella* increased in recent years. The disease is often severe in early infancy. Haltalin et al.² found shigellosis in 729 cases in the pediatric out-patient clinic during 1969 and 1970.

El Falaky et al.³ studied 100 out-patients with diarrhea in Egypt and found that 33 percent had Shigellosis.

The clinical symptoms of dysentery may vary according to the severity of the disease. The stool is watery and contains large amounts of mucus and little blood.

Haltalin et al.⁴ reported 136 hospitalized patients with Shigellosis, 35 percent had convulsions, 85 percent had fever, and all had laxanal sphincter tone.

Of our cases, 75 percent had tenesmus and 96 percent had abdominal pain. All had diarrhea while 20.8 percent had mild dehydration. In 12 cases, the fever was low and the stools contained large amounts of mucus and little blood.

The maintenance of fluid and electrolyte balance is especially important in infants and small children in the treatment of dysentery.

TABLE V
CLINICAL MANIFESTATIONS OF CHILDREN WITH SHIGELLOSIS

	Cases	Percentage
Diarrhea	52	100 %
Fever	49	94 %
Vomiting	30	57 %
Abdominal Pain	50	96 %
Tenesme	39	75 %
Dehydration (mild)	40	20.8%
Headache	8	15 %

The cases chosen for this study from the out-patient clinic were those who were not critically ill and without severe dehydration. There were no signs of circulatory insufficiency, lethargy, severe vomiting or gastric distension. In the absence of these findings and the presence of only mild signs of dehydration, the patients were fed mixtures of sugar and electrolytes for periods of 6 to 8 hours. Chemotherapy was continued at home, following the request of the patients' parents. When the infant was found to be tolerating the carbohydrate and electrolyte mixture by mouth, the caloric intake was increased gradually by substituting mixtures which contained protein (yoghurt, rice pudding, apple juice) until the usual dietary intake was achieved in 5 to 6 days.

The evaluation of the effects of the administration of antibiotics in shigellosis is very difficult because the disease varies markedly in severity from a very mild illness necessitating vigorous fluid replacement.⁶

Haltalin et al.^{2,4} reported that clinical and bacteriologic good results were observed within 48 hours in patients treated with ampicillin since all the isolated were sensitive to ampicillin.

Specific antibiotic therapy is useful. The administration of the antibiotic is not a matter of urgency in mild forms of diarrhea. It is useful to wait for the results of bacteriologic culture and sensitivity studies.

The patients were treated with ampicillin trihydrate (100 mgr per kg. body weight daily), and streptomycin was given in addition for one week, which inhibited peristaltic activity, absorbed such intestinal contents as water etc., and produced a more bulky stool with the help of its ingredients, eg., pectin and kaolin. The general condition of patients seemed to be improving a great deal. Stool specimens were taken and cultured. Five cases with positive stool culture were again

treated with ampicillin for a period of 5 days. The patients who had a negative stool culture were not given ampicillin.

Two cases who showed positive *Shigella* cultures and continuing diarrhea and tenesmus during the second week were treated with ampicillin and kanamycin for one week.

The above patients recovered at the end of the second week and third stool culture was found negative. Thus at the end of chemotherapy, all of our cases showed good prognosis.

The cases which had positive *Salmonella paratyphi* B. were treated with ampicillin.

In six infants in whom enteropathogenic *E. coli* were isolated, we obtained good results with kanamycin and ampicillin.

The seasonal distribution and types of *Shigella* bacilli found in our cases seem to show similarities with those in the existing studies in the literature.

Summary

This study was carried out on 392 diarrheal and 111 control cases selected from those of the Hacettepe Out-Patient Pediatric Clinic between May and September 1972. The patients ranged in age from less than two weeks to 12 years. The rectal swab technique was employed.

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