CHILDHOOD SHIGELLOSIS AT KING CHULALONGKORN MEMORIAL HOSPITAL, BANGKOK, THAILAND: A 5-YEAR REVIEW (1996-2000)

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Abstract. The objective of this study was to evaluate the demographic data and clinical presentation of childhood shigellosis, and to study the microbiological data and antimicrobial susceptibilities of *Shigella* spp. Nine thousand nine hundred fourteen stool culture specimens from children aged 0-15 years who were treated at King Chulalongkorn Memorial Hospital, Bangkok, Thailand, between 1996 and 2000 were retrospectively reviewed. Data were collected from microbiological records and medical charts of childhood shigellosis in terms of demographic data, symptoms, signs, and complications of the patients, and the species and antimicrobial susceptibilities of the organisms. The data were analyzed in terms of means, ranges, and percentages. Of 1,523 children whose stool cultures were positive for pathogenic bacteria, 80 (5.3%) were infected with *Shigella* spp; 34 females and 46 males. The age distribution ranged from 1 day to 13 years with a mean age of 3.6 years. Common clinical presentations included diarrhea (96.6%), fever (77.6%) and vomiting (44.8%); seizures were the most common complication found (27.6%). Watery and mucous were the most common characteristics of stools. The major *Shigella* spp found was *S. sonnei* (62.8%), which was susceptible to co-trimoxazole, ampicillin, cefazolin and ciprofloxacin in 2.3, 84.1, 100 and 100%, respectively. A short course of quinolones or oral cephalosporins should be recommended for the treatment of childhood shigellosis in areas with low susceptibility rates to co-trimoxazole and ampicillin.

INTRODUCTION

Shigellosis is an infective diarrheal disease distributed worldwide, especially in tropical areas with poor sanitation. *Shigella* is also one of the most important causative agents for travelers' diarrhea. It is estimated that 250 million cases, mostly children aged 2-3 years, are annually infected by the bacteria and 654,000 cases die (Leviene Myron, 2000). Four species of *Shigella* are recognized as pathogenic to humans: *S. sonnei*, *S. boydii*, *S. flexneri* and *S. dysenteriae.* Both *S. sonnei* and *S. boydii* are usually associated with mild illness of short duration and watery or mucous bloody stool. Infections caused by *S. flexneri* are generally more severe, last longer, and cause mucous bloody stools. *S. dysenteriae* causes the most serious illness with high death rates. *S. sonnei* is a principal cause of endemic shigellosis in industrialized countries, whereas *S. flexneri* is predominant in many developing countries, including in Thailand (Taylor *et al*, 1986: Echeverria *et al*, 1989: Thisyakorn *et al*, 1992).

Changes in the worldwide epidemiology of *Shigella* spp were documented in the last decades of the 20th century. We conducted this study in order to determine the changes in demographics, clinical presentation, predominant species and antimicrobial susceptibilities of *Shigella* spp in Thai pediatric patients.

MATERIALS AND METHODS

Microbiology records of stool culture specimens collected from children aged 0-15 years who were treated at King Chulalongkorn Memorial Hospital, Bangkok, Thailand, from January 1996 to December 2000 were retrospectively reviewed. Specimens culture positive for *Shigella*

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spp were included in this study. Data collected included the species and antimicrobial susceptibilities of the organisms. The medical records of the patients were reviewed in terms of age, gender, clinical presentation, complications and laboratory findings (complete blood count, electrolytes and stool examination). Descriptive data were analyzed in terms of means, ranges and percentages.

RESULTS

Of 9,914 stool culture specimens collected from children 0-15 years of age, 1,523 specimens were positive for enteric pathogens. Eighty specimens were positive for *Shigella* spp, 5.3% of all the pathogenic bacteria. *S. sonnei*, *S. flexneri*, *S. boydii* and *S. dysenteriae* were found in 68.8%, 25.0%, 5.0% and 1.2% of those with *Shigella* infection, respectively. Of the 80 children with shigellosis, 46 were males (57.5%) and 34 were females (42.5%). The mean age of the *Shigella* infected children was 3.6 years, with a range from 1 day to 13 years.

Sixty-four medical records (80.0%) were available and reviewed. Underlying diseases included malnutrition (17.2%) and acute leukemia (3.4%). Clinical presentations included diarrhea (96.6%), fever (77.6%), vomiting (44.8%), abdominal pain (20.7%), dehydration (81.0%), alteration of consciousness (15.5%) and neck stiffness with normal cerebrospinal fluid (1.7%). Complete blood counts showed 68.3% with leukocytosis (white blood cell count >10,000 cells/mm^3) and 31.7% with neutrophilia (neutrophils >75%). Serum electrolytes showed 10.3% with hyponatremia (sodium <130 mEq/l), 10.3% with hypokalemia (potassium <3.5 mEq/l) and 23.1% with metabolic acidosis (bicarbonate <15 mEq/l). The stool characteristics were macroscopically watery (49.1%), mucous (32.7%) and mucous and bloody (18.2%). The stool microscopic examinations found leukocytes (in 89.1%) and erythrocytes (in 63.6%).

Febrile seizures were the most common complication (in 27.6%); 6.9% had a previous history of febrile seizures. Other complications included one case each of meningism, shock, gallstones, chronic diarrhea and secondary lactase deficiency.

Concerning antimicrobial susceptibility patterns, *S. sonnei* was susceptible to co-trimoxazole, ampicillin, and cefazolin in 2.3%, 84.1%, and 100%, respectively; *S. flexneri* in 5.6%, 17.6%, and 88.9%, respectively); *S. boydii* in 66.7%, 33.3%, and 66.7%, respectively; and *S. dysenteriae* in 0%, 0%, and 100%, respectively. There was no evidence of resistance to

Table 1
Percentages of antimicrobial susceptibilities in *Shigella* species from the children in our study.

Antimicrobial agents	Percentages of antimicrobial susceptibility in			
	S. sonnei (n=47)	*S. flexneri* (n=17)	*S. boydii* (n=3)	*S. dysenteriae* (n=1)
Ampicillin	84.1	17.6	33.3	0
Amoxi-clavulanate	100	62.5	33.3	100
Sulbactam-ampicilin	91.7	50	ND	ND
Co-trimoxazole	2.3	5.6	66.7	0
Cefazolin	100	88.9	66.7	100
Cefpirome	100	94.4	100	ND
Imipenem	100	100	66.7	100
Piperacillin-tazobactam	89.5	66.7	ND	ND
Pefloxacin	86.7	80	ND	ND
Ciprofloxacin	100	100	100	100
Gentamicin	100	100	100	100
Ceftriaxone	100	100	100	100

Note: ND = Not done.

ceftriaxone, ciprofloxacin or gentamicin, regardless of the species of *Shigella* (Table 1).

DISCUSSION

In our study, childhood shigellosis was not uncommon (5.3% of all culture positive stools). In Thailand, *S. flexneri* used to be the most common pathogen for childhood shigellosis (83.5%) (Thisyakorn *et al*, 1992). However, in our study, as in industrialized countries and a recent study in Thailand (Jirakhun *et al*, 1997), the predominant species was *S. sonnei*. We need reliable national data and ongoing surveillance of this bacterial infection.

The demographic data, clinical presentations, and laboratory findings of childhood shigellosis in our study were similar to those in other previous reports. The decline in childhood malnutrition in Southeast Asian countries over 1980-2000 (27.7% to 18.9%) (Onis M *et al*, 2000) explains the lower rate of malnutrition among our patients (17.2%) compared to a previous study (42.1%) (Sirivichayakul and Thisyakom, 1998).

Concerning antimicrobial susceptibilities, we found that 95.5-100% of *Shigella* spp were susceptible to cephalosporins, quinolones and aminoglycosides, while 63.1-87.3% and only 6.1% of *Shigella* spp was susceptible to penicillins and co-trimoxazole, respectively. The percentage susceptibility of *S. sonnei* to ampicillin (84.1%) was higher than that of *S. flexneri* (17.6%). These findings suggest that ampicillin may be used with a successful outcome in shigellosis caused by *S. sonnei.* In areas of high resistance to penicillins and co-trimoxazole, endemic area for *S. flexneri* or in severe cases of shigellosis, quinolones or third generation cephalosporins should be considered (Ashkenazi *et al*, 1993). Short course quinolone use in children provides a good response with no serious musculoskeletal complications (Lolekha *et al*, 1991; Salam *et al*, 1998; Tupasi, 1999).

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