SHIGELLOSIS IN THAI CHILDREN: EXPERIENCE FROM A RURAL HOSPITAL 1985-1993

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Abstract. Six hundred and ninety-four cases of shigellosis in Nakhon Nayok Hospital from January 1985 to December 1993 were studied to determine epidemiologic and microbiological features. Forty-five percent of cases were children under the age of 14 years. The majority of cases were in children under the age of four. The organism was found throughout the year, with peak incidence in June and July. The most common type isolated was *Shigella flexneri*, about 74.43%. Only 0.32% of organisms were *Shigella dysenteriae*. *Shigella* isolates showed a high rate of resistance to ampicillin and co-trimoxazole, in 1993 only 16.67% and 22.22% were sensitive respectively to these 2 drugs, but 100% were still sensitive to nalidixic acid. Fewer cases of shigellosis were isolated in recent years possibly due to widespread use of quinolones in the treatment of acute infective diarrhea in adults.

INTRODUCTION

Diarrhea continues to be a common health problem in developing countries. In Thailand the morbidity rate is about 450 per 100,000 population. It can be caused by bacteria, viruses or toxins. Of bacterial diarrhea the three most common organisms are *E. coli*, *Salmonella* and *Shigella*. Infection by *Shigella* spp is an important cause of infections diarrhea in developing countries. Infection is by the fecal-oral route from person to person. Antimicrobial therapy is recommended for most patients because it shorten the duration of disease and eliminates organisms from the feces (Levine, 1982). The widespread use of antibiotics results in drug resistant bacteria; in the past ampicillin and co-trimoxazole have been the drugs of choice for the treatment of shigellosis (Keusch and Bennish, 1989; Bennish and Salam, 1992). These antibiotics were effective, inexpensive, and safe in children. Most drug resistance in enteric bacteria is by widespread transmission of plasmids. This study set out to follow the epidemiologic and microbiological features of shigellosis in our population. (Thisyakorn and Reinprayoon, 1992; Moolasart, 1994).

MATERIALS AND METHODS

We have performed a retrospective study to evaluate clinical manifestation and distribution of *Shigella* in Thai children at Nakhon Nayok Hospital from 1985-1993. We reviewed all bacteriological confirmed cases of shigellosis. Stool cultures were done on salmonella-shigella agar and biochemically identified by standard methods and serological grouping by slide agglutination test using commercial antisera. The disk diffusion method was used to detect antibiotic susceptibility testing. All bacteriologically confirmed cases of shigellosis from 1985-1993 were studied for epidemiological features and susceptibility patterns. Detailed history and physical examination were reviewed in 27 pediatric patients.

RESULTS

A total of 694 cases (adults and children) were found with stool culture positive for *Shigella* species; 45% were children. Most of them were under the age of four. The disease was found throughout the year, with the peak in June and July (Fig 1). Of 309 cases in children 74.43% were *S. flexneri*, 22.98% were *S.*

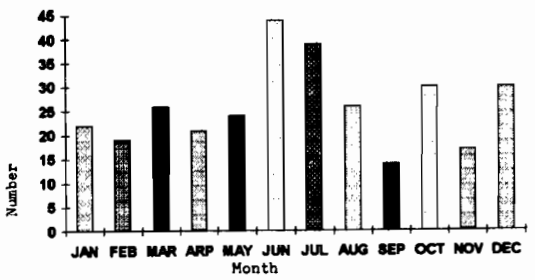

Fig 1–Monthly distribution of children with shigellosis at Nakhon Nayok Hospital (1985-1993).

sonnei, 2.27% were *S. boydei* and only 0.32% were *S. dysenteriae.*

The most common presenting symptoms were fever and diarrhea. Fever occurred in 70.4%, 40% presented with watery diarrhea, convulsions occurred in 22.2%, abdominal pain in 14.8% and vomitting in 37%.

For all types of *Shigella* species isolated in pediatric patients susceptibility to ampicillin was 10.3% in 1985 and 16.7% in 1993 (Fig 2).

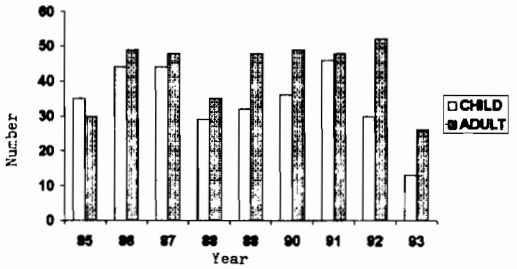

Fig 2–Number of cases of shigellosis in children and adult at Nakhon Nayok Hospital (1985-1993).

Susceptibility to co-trimoxazole decreased from 71.4% in 1985 to 10.7% in 1992 and 22.2% in 1993 (Table 1).

Shigella were still 100% susceptible to nalidixic and cephalosporin of all cases of *S. flexneri* susceptibility to ampicillin decreased to 10-20% and susceptibility to co-trimoxazole decreased from 70% to zero in 1993. *S. flexneri* isolates are still susceptible to nalidixic acid and cephalosporin (Fig 3).

Of all cases of *S. sonnei* isolated susceptibility to co-trimoxazole has decreased from 50% in 1986 to 0% in 1991 and 1992. Conversely, susceptibility to ampicillin has increased from 20% in 1986 to 100%

Table 1

Antimicrobial susceptibility of *Shigella* percentage of sensitive strains.
Susceptibility (1985-1993)

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993
Ampicillin	10.3	18.7	21.7	18.9	14.8	28.2	21.4	17.4	16.7
Co-trimoxazole	71.4	54.8	59.8	18.8	16.1	14.3	14.6	10.7	22.2
Nalidixic acid	100	100	100	100	100	100	100	100	100
CAz	100	100	100	100	100	100	100	100	100

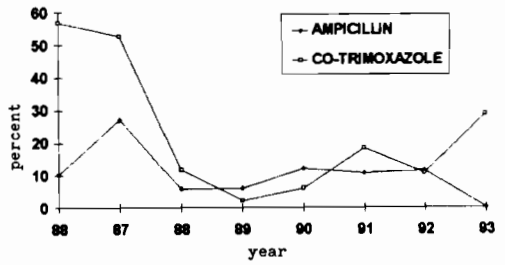

Fig 3–Susceptibility pattern of *S. flexneri.*

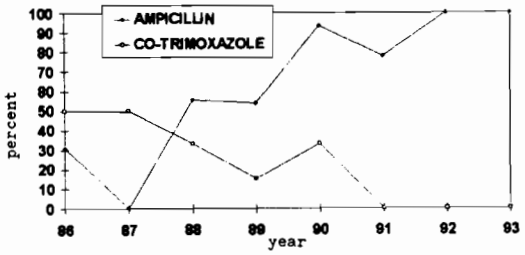

Fig 4–Susceptibility pattern of *S. sonnei.*

in 1992-1993 (Fig 4). All *S. sonnei* were still susceptible to nalidixic acid and cephalosporin.

DISCUSSION

Shigellosis is common in young children, especially under four years. Although seasonal patterns vary from place to place in Thailand, it is more common in the rainy season with the peak in June and July (Thisyakorn and Reinprayoon, 1992). The presenting symptoms in children were high fever and diarrhea, either watery or mucoid and bloody. The mechanism of illness are toxin production in the small bowel causing watery diarrhea and tissue invasion in the colon resulting in dysentery (Levine, 1982). Dupont *et al* (1969) have demonstrated that watery diarrhea occurs 48 to 72 hours before dysentery. Stoll *et al* (1982) have reported in Bangladesh that patients with watery diarrhea had shorter duration of illness before coming to hospital than those with dysentery. In our series patients usually came to hospital earlier and presented with high fever with watery diarrhea in about 40% of cases. Convulsion which is the most common neurologic finding in shigellosis was seen 22.2% in our series. Convul-

sions appear to be more common in shigellosis in children, it can be by rapidly rise of fever or by neurotoxin of the organism, the mechanism is still unclear (Avital *et al*, 1982). We also found 3 cases with acute toxic encephalopathy, of which 2 died. Fulminating encephalopathy from *Shigella* infection rarely occurred but can be severe (Sandyk and Brenna, 1983). Other complications such as bacteremia, hemolytic-uremic syndrome (Waler and Alsaeid, 1990) and toxic megacolon were not seen. Many studies have reported that fluoquinolones are effective and safe for treatment of shigellosis (Fontaine, 1989; Shaad, 1992). Widespread use of quinolones in treatment of infections diarrhea in adults probably decreases the number of cases in adults and children.

High prevalence of resistant strains of *Shigella* were found in this series. Susceptibility to ampicillin and co-trimoxazole was low. All *Shigella* isolated in our series were sensitive to nalidixic acid. Nalidixic acid has been approved for use in children older than 3 months. Quinolones can cause arthropathy in animals and have not been approved for use in children. In 1992 there were reports of using quinolones in children and there are no repoted cases of quinolone-induced arthropathy in human (Schaad, 1992). Large numbers of children treated with quinolone and long term follow up for years are needed to confirm this. If they become less expensive and prove to be safe for children they will become the treatment of choice in shigellosis. In our series before 1990 half of the cases were treated with co-trimoxazole, one third were treated with nalidixic acid and some with norfloxacin. After 1990 most of the cases were treated with quinolones or nalidixic acid.

In conclusion, *Shigella* are a serious problem for developing countries because of epidemics and multiple drugs resistance. The most common presenting symptoms were fever with either mucoid bloody or watery diarrhea. The most frequently strains isolated were *S. flexneri* and *S. sonnei*. In our series there was a high prevalence of resistant strains isolated. Ampicillin and co-trimoxazole should not be used for the treatment of shegellosis in Thailand. The choice of antibiotics should based on the local susceptibility pattern.

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