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Changing Patterns of Serotypes and Antimicrobial Susceptibilities of *Shigella* Species Isolated from Children in Calcutta, India

Swapan Kumar Niyogi*, Utpala Mitra and Phalguni Dutta

Division of Microbiology and Clinical Medicine, National Institute of Cholera & Enteric Diseases, P33 CIT Road Schm XM, P O Beliaghata, Calcutta 700 010, India

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Shigellosis occurs both in epidemic and endemic forms in children and remains a major public health problem in developing countries. Over the past decades, *Shigella* spp. have become progressively resistant to most of the widely used and inexpensive antimicrobials (1). Moreover, changes in the incidence of *Shigella* subgroups from time to time makes it difficult to formulate a drug of choice for shigellosis (2). The present study reports the distribution of *Shigella* subgroups and the antimicrobial susceptibility pattern of *Shigella* spp. isolated from children in Calcutta, India.

From January 1998 to December 2000, a total of 675 stool samples were collected from children suffering from acute diarrhea attending the Diarrhoea Treatment Unit at Dr. B.C. Roy Memorial Hospital for Children, Calcutta, and were cultured for *Shigella* spp. All isolates were confirmed serologically by slide agglutination using commercially available specific antisera (Denka Seiken, Tokyo). Antimicrobial susceptibility tests were performed using an agar diffusion technique method following National Committee for Clinical Laboratory Standards guidelines (3).

The thirty-four strains of *Shigella* spp. that were isolated were distributed as follows: 22 (65%) were *S. flexneri*, 7 (20%) were *S. sonnei* and 5 (15%) were *S. boydii*. No *S. dysenteriae* strains were isolated. The antimicrobial susceptibility pattern of *Shigella* strains is shown in Table.

Temporal and spatial variations in the isolation of *Shigella* spp. have been reported in various parts of India from time to time. Before 1984, *S. flexneri* was the predominant species isolated sporadically from 3% of diarrhea cases in Calcutta (4). *S. dysenteriae* type 1, the most virulent and epidemic potential serotype, was not isolated in that period. In 1984, an epidemic of shigellosis caused primarily by *S. dysenteriae* type 1 broke out in the eastern parts of India affecting thousands of people and caused many deaths in and around Calcutta (5). During the epidemic of bacillary dysentery (1984), isolation of *Shigella* spp. as well as *S. dysenteriae* type 1 was high. Decreased isolation of *S. dysenteriae* type 1 and increased isolation of *S. flexneri* was observed during post-endemic years (6). However, during 1990-1992 *S. dysenteriae* type 1 was isolated more from Calcutta (7). During the period 1995-1996 in a study conducted among children, *S. flexneri* was isolated as predominant serotype (51%) followed by *S. boydii* (21%), *S. sonnei* (17%), and *S. dysenteriae* type 1 (10%), respectively (8). During the 1984 epidemic highly encouraging results through the use of nalidixic acid in the treatment of multi-resistant *S. dysenteriae* type 1 infection was reported from Calcutta (9). However, within a short period the widespread use of the drug resulted in the emergence of a nalidixic acid-resistant *S. dysenteriae* type 1 strain in several parts of the world including India (10), negating the efficacy of the drug. A study conducted in our institute during 1990-1992 demonstrated a significantly low resistance to nalidixic acid and furazolidone (7). During 1995-1996, however, increased resistance to nalidixic acid and furazolidone was observed (8). In the present study, a significantly low resistance to nalidixic acid was observed. The

Table. Percentage of antimicrobial resistant of isolated *Shigella* strains

Antimicrobial agents	% resistance for			
	All *Shigella* isolates (n=34)	*S. flexneri* (n=22)	S. *sonnei* (n=7)	*S. boydii* (n=5)
Ampicillin	76	95	43	40
Cefuroxime	0	0	0	0
Chloramphenicol	47	59	14	40
Ciprofloxacin	0	0	0	0
Co-trimoxazole	92	95	71	100
Furazolidone	88	100	71	60
Gentamicin	3	4.5	0	0
Nalidixic acid	6	9	0	0
Norfloxacin	0	0	0	0
Tetracycline	97	100	86	100

*Corresponding author: Tel: +91-33-350-0448, Fax: +91-33-350-5066, E-mail: niced@cal2.vsnl.net.in

development of resistance to furazolidone steadily increased over the past few years (8) and we also observed a markedly high resistance to furazolidone.

The shift in the prevalence of serogroups and the changing pattern in antimicrobial susceptibilities among *Shigella* isolates poses a major difficulty in the determination of an appropriate drug for the treatment of shigellosis. Continuous monitoring of antimicrobial susceptibilities of *Shigella* spp. through a surveillance system is thus essential for effective therapy and control measures against shigellosis.

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