

Multiple Drug Resistant Non-Typhoidal *Salmonella* spp Associated with Acute Diarrheal Disease

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Abstract. Rectal swabs/stool specimens from 115 children (0-5 years) suffering with acute diarrhea were screened for non typhoidal salmonella species. 7 (6%) patients were found to be positive for non typhoidal salmonella. 4 (3.47%) were positive for *S. paratyphi* B and 3 (2.6%) were positive for *S. typhimurium*. Multidrug resistance was seen in 57 percent of the strains. All strains were sensitive to Ciprofloxacin. All strains were resistant to Ampicillin followed by Ciprofloxacin. All strains were resistant to Ampicillin followed by Gentamycin (43%), Kanamycin (43%), Tetracycline (43%), Streptomycin (28.5%) and Chloramphenicol (28.5%). (Indian J Pediatr 1995; 62 : 703-705)

Key Words : Non typhoidal salmonella; *Salmonella typhimurium*; *Salmonella paratyphi* B; Multidrug resistance; Gastroenteritis.

Non typhoidal salmonella gastroenteritis refers to disease caused by serotype of organisms in the genus salmonella other than *Salmonella typhi*. The present study was aimed to find out the multiple drug resistant non-typhoidal *Salmonella* spp. in children having acute diarrhoea.

MATERIAL AND METHODS

Rectal swabs/stool specimens collected from 115 children 0-5 years of age with acute diarrhea prior to antibiotic therapy from the Institute of Child Health and Hospital for Children, Madras during the year 1994 constituted the material for this study. The stool specimen for bacteriological study were processed for the isolation

of bacterial enteropathogens using standard procedures.¹ These isolates were confirmed by slide agglutination test using *Salmonella* poly 'O', A-G, *Salmonella* antisera at National Salmonella and *Escherichia* centre, Central Research Institute, Kasauli, Himachal Pradesh. The drug sensitivity was tested on Mueller Hinton agar by Kirby Bauer disc diffusion method² using *Escherichia coli* NCTC 10418 (Sensitive to all drugs) as a control strain. The concentration of each antimicrobial agent (in µg) tested per disc was Ampicillin (AMP) 10, Gentamycin (GEN) 15, Streptomycin (STR) 10, Kanamycin (KAN) 30, Tetracycline (TET) 30 and Ciprofloxacin (CPF) 30.

RESULTS

7 isolates (6%) belonging to genus *Salmonella* were isolated from 115 rectal swabs/stool samples. Among non-typhoidal salmonella, *Salmonella paratyphi* B was the

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commonest serotype (3.47%) followed by *S. Typhimurium* (2%). Both were belonging to the Kauffmann white group 'B'. The 4 isolates of *S. paratyphi B* belong to the antigenic structure 4, 5, 12, b, 1, 2 and 3 isolates of *S. typhimurium* belong to antigenic structure 4, 5, 12, i, 1, 2. Other organisms isolated from the acute diarrhea includes *Escherichia coli* (82.6%), *Klebsiella spp.* (4.3%), *Shigella spp* (2.6%) and *Proteus spp* (1.7%). All the 7 non-typhoidal *Salmonella* isolates were isolated from children below 1½ years of age. 4 (57%) out of the 7 strains showed multi drug resistance to various antibiotics. All the 7 strains were resistant to Ampicillin (100%) followed by Gentamycin 3 (43%), Kanamycin 3 (43%), Tetracycline 3 (43%), Streptomycin 2 (28.5%) and chloramphenicol 2 (28.5%). All the 7 strains were sensitive to ciprofloxacin (Table 1).

DISCUSSION

The present study reports an isolation rate of 6% of non typhoidal *Salmonella spp* among children (0-5 years) with acute diarrhea in Madras. Similar result has been reported in a rural area in Maharashtra³ which indicates as incidence of 4.9% in children population with diarrhea. However Chandigarh report⁴ indicated a 10% isolation rate of *salmonella spp* in which the study group includes both adults and children. Similarly a brazil study⁵ reported 8% isolation rate of *Salmonella spp*, which may be due to the use of antimicrobial drugs in patients, as these drugs may act as a predisposing factor.

World wide, antimicrobial resistant *Salmonella spp* are becoming a major cause of pediatric diarrhea in large urban areas of middle income economy countries.⁵ It was

TABLE 1. Antibiogram Pattern of Salmonella Isolates

Antibiotics	Resistant		Sensitive	
	No. of isolates	Percentage	No. of isolates	Percentage
Ampicillin (10 µg)	7	100	—	—
Gentamycin (15 µg)	3	43	4	57
Kanamycin (30 µg)	3	43	4	57
Tetracycline (30 µg)	3	43	4	57
Streptomycin (10 µg)	2	28.5	5	71.5
Chloramphenicol (30 µg)	2	28.5	5	71.5
Ciprofloxacin (30 µg)	—	—	7	100

observed in the present study that all *Salmonella* strains were resistant to Ampicillin (100%) and all the strains were sensitive to ciprofloxacin (100%). Multi drug resistance (MDR) was seen in 57% of the

strains. The present finding and other reports^{3,6} suggest that *Salmonella* serotypes are acquiring resistance to a large number of antimicrobial agent in common use. Abuse of one or more antibiotics thus

teems to lead the picking up of strains which are resistant to most of the antibiotics.

These findings once again stress the emergence of multi drug resistant strains due to indiscriminate use of antimicrobials especially by general practitioners. Infect antibiotics should be used only in fulminant diarrheas and invasive Samonellosis after obtaining the antibiogram pattern. Mild to moderate diarrheas being self limiting and should not be treated with antimicrobials.

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TOWARDS A SINGLE VACCINE FOR CHILDREN

Every year, eight million children die in developing countries from viral and bacterial diseases, and 900 million are severely ill. Viral diseases which kill more than three million children every year include measles (1.5 million deaths) : rotaviral enteritis (800,000 deaths) : Poliomyelitis; hepatitis A and E : denoue (30-60) million infections) : with 10,000 deaths) and acute respiratory viral diseases.

Bacterial diseases, resulting in the death of over five million children a year, include tetanus (800,000 newborn infants) : meningococcal meningitis : bacterial diarrhoeal diseases (more than 1.6 million deaths from shioella, Cholera. Escherichia coli and typhoid) : pneumococcal pneumonia (the leading cause of death from acute respiratory illness) : and tuberculosis, which infects both children and adults (over 2.5 million deaths).

These tragedies could be largely prevented by new and improved vaccines, and the international community is joining forces to make this a reality in the 1990s. In 1984 the WHO/UNDP Origranne fir Vaccine Development (PVD) was created to coordinate international efforts with academic institutions or with other scientific groups. In 1991. The Children's Vaccine Initiative was launched to intensify those efforts.

Research using a wide range of techniques is being carried out with a visionary goal in mind-that of perfecting a "Children's vaccine", a one-shot multiple vaccine, preferably given orally, which would protect every child for life against all important infectious diseases. Such an advance would simplify vaccine programmes in developing countries and help to save millions of children from sickness and death.

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