

Antimicrobial Sensitivity Pattern of Salmonella Typhi in Eastern Uttar Pradesh

Rajniti Prasad*, P.C. Jha**, O.P. Mishra*

*Department of Pediatrics, Institute of Medical Sciences, Banaras Hindu University, Varanasi-221005. **Department of Pathology, Patna Medical College, Patna.

Abstract

Background: Enteric fever is common waterborne disease in India and poses a therapeutic challenge in children due to emergence of drug resistant organism. **Objective:** the present study was undertaken to review the changes in antibiotic sensitivity and resistance pattern of *salmonella typhi* in eastern Uttar Pradesh. **Methods:** The study consisted of 79 clinically and serologically confirmed cases of enteric fever aged 2-15 years from may 2009 to January 2015 and subjected to blood culture and sensitivity. We had not done phage typing of isolated organism. **Results:** *Salmonella typhi* was sensitive to ciprofloxacin, cefotaxime, ceftriaxone and cefixime in 75%, 72%, 71% and 72% respectively and resistant to both ciprofloxacin and ceftriaxone in 38%. There is declining trend in resistant pattern to amoxicillin, chloramphenicol and cotrimoxazole as observed and reported from same institute in 1996. **Conclusion:** The drug resistant enteric fever still remains a therapeutic challenge and combination therapy with ceftriaxone and other antimicrobials may be another option.

Keywords: Enteric fever; *Salmonella typhi*; Sensitivity.

Introduction

Enteric fever is an important public health problem in children in developing countries including India. The emergence of multi-drug resistant salmonella typhi (MDRST) and increasing number of enteric fever cases every year have posed a therapeutic challenge in children [1]. Although a number of drugs effective against salmonella typhi (*S. typhi*) are available, the selection has become increasingly difficult every year. The present study was undertaken to review the change in antibiotics sensitivity and resistance pattern of *S. typhi* after a decade in eastern region of Uttarpradesh.

Methods

The study consisted of 79 confirmed children of enteric fever, aged 2 years to 15 years attending out

patient department or admitted in children hospital, from May 2009 to January 2015 at a tertiary care hospital, India.

Enteric fever was diagnosed on the following basis

1. Clinical symptomatology: fever more than 7 days and presence of splenomegaly,
2. Positive widal test (O titre \geq 1:180) and
3. Positive blood culture

Inclusion and exclusion Criteria: Only cases with positive blood culture for salmonella typhi was taken for study. Other cases were excluded from study. Patient with concomitant malaria and lower respiratory tract infection and infectious mononucleosis (diagnosis made by positive latex agglutination tests) were also excluded from study.

Complete blood count was done in all patients. After proper aseptic precaution, 5 ml of blood was collected from antecubital vein prior to start of anti-

Corresponding Author: Rajniti Prasad, Professor and Incharge, Division of Pediatric Neurology, Department of Pediatrics Institute of Medical Sciences, Banaras Hindu University, Varanasi-221005 (U.P.).

E-mail: rajnitip@gmail.com

microbial therapy and put directly in L-J media and sent for culture and sensitivity in department of microbiology. Presently, there is no facility of phage typing of salmonella in the laboratory.

Treatment: Outpatient children were treated empirically initially with cefixime, whereas in door patient; ceftriaxone. After getting report of culture and sensitivity, ciprofloxacin or ofloxacin was added in regimen and continued for minimum of 10 days or 5 days after period of deconvalescence.

Result

Ninety six children were enrolled in study but 17 children were excluded from study. Six children had concomitant malaria, 4; septicemia, 4; bacterial meningitis and 3; infectious mononucleosis. Out of Seventy nine remaining children with enteric fever, 49 were males and 30; females, in age range 2-15 years (mean age: 7.23±3.01). The lowest age of affected child was 2.5 year. Fever was present in all cases and

leucopenia in 50 (63.3%) cases. Widal test was positive in 58 (73.4%) children.

The organism was most sensitive to ciprofloxacin (75%) followed by cefotaxime (72%), ceftriaxone (71%) and cefixime (72%). Antimicrobials which showed good sensitivity pattern were amoxicillin (66%), cephalexin (63%), gentamicin (62%) and ampicillin(54%). The isolates were resistant to commonly used drug like ampicillin(46%), chloramphenicol (58%), cotrimoxazole (62%) and amoxicillin(34%), which have reduced as against data of 1996 [1]. Isolates were also resistant to ciprofloxacin (25%), cefotaxime (28%), ceftriaxone (29%), cefixime(31%) and both ciprofloxacin and ceftriaxone (38%), which had approximately doubled as reported in 1996 (Table1). It was observed that there is declining trend in resistance pattern in *S. typhi* with amoxicillin, chloramphenicol and cotrimoxazole but increasing resistance to ciprofloxacin, third generation parenteral and oral cephalosporins and gentamicin (Table 1).

Table 1: Antibiotic sensitivity / resistance pattern of Salmonella typhi

Drugs	2009-2015		1996	
	Sensitivity(%)	Resistance(%)	Sensitivity(%)	Resistance(%)
Ciprofloxacin*/ofloxacin	75	25	87	13
Ceftriaxone	71	29	88	12
Cefotaxime	72	28	79	21
Amoxicillin	66	34	62	38
Cephalexin	63	37	59	41
Cefixime	--	--	72	28
Ampicillin	54	46	9	91
Chloramphenicol	42	58	31	69
Cotrimoxazole	38	62	31	69
Both ciprofloxacin and ceftriaxone	62	38	10	90
Gentamicin	62	38	91	9

* 1996, sensitivity was done only with ciprofloxacin

Discussion

There has been an emergence of MDRST strains throughout the world. Due to the development of multi drug resistance and atypical presentation of the disease, enteric fever is becoming difficult to diagnose and manage unless aided by blood culture studies. Integrons are a major vehicle for the spread of multiple-antibiotic resistance [2]. It was also reported that most MDR Salmonella typhi isolates have a conjugative plasmid of the IncHI1 type [3]. This plasmid has been implicated as a significant factor in the persistence and re-emergence of Salmonella serovar Typhi. The type of β -lactamase resistance reported was mostly TEM-1. PFGE pattern of XbaI-digested genomic DNA of Salmonella had also been

reported to be responsible for MDRST in India [3,5].

The observed declining resistance in present study to antimicrobials might be due to infrequent use of amoxicillin, chloramphenicol and cotrimoxazole in past decade and wide spread use of quinolones and third generation parenteral and oral cephalosporins in treatment of enteric fever.

Kumar et al. [4] had reported that Ceftriaxone is well-tolerated and effective drug but expensive, whereas ofloxacin is safe, cost-effective and therapeutic alternative in treatment of multidrug resistant typhoid fever in children with comparable efficacy to ceftriaxone. Sen et al. [5] also reported from Kolkata that Phage type E1 was the most common (60.3%) and most of the MDR strains belonged to phage type E1 and biotype I. Drug resistant typhoid

fever still remains a therapeutic challenge. Combination therapy with ciprofloxacin and ceftriaxone perhaps is most effective. However, in situations when the patient is critically ill and not responding, gentamicin may be as an adjunct drug.

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