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Changing Antimicrobial Susceptibility of *Salmonella* Isolates: A Retrospective Study of 3 year (2008-2010) from a Tertiary Care Hospital

P. Kharbanda, N. Duggal, R.K. Mahajan, P. Chaskar and C. Hans

Department of Microbiology, Dr.RML Hospital and PGIMER, New Delhi - 110 001, India.

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Present study was undertaken to study changing trend of antimicrobial sensitivity of enteric fever causing Salmonella. A total of 2431 strains of Salmonella Typhi and Salmonella Paratyphi A isolated from blood during the period 2008-2010 were included in the study. Ninety percent of Typhi and ninety six percent Paratyphi A isolates were sensitive to Chloramphenicol while sensitivity to ceftriaxone and fluoroquinolones was 89% and 87% respectively. With this emerging trend of increasing sensitivity of enteric fever causing Salmonella to Chloramphenicol, it requires scientific consensus as to whether Chloramphenicol can be kept as reserve drug for cases of quinolone and third generation cephalosporin treatment failure and complicated cases of enteric fever.

Key words: *Salmonella*, antibiogram, Chloramphenicol.

Typhoid fever caused by Salmonella enterica serotype Typhi (*S.typhi*) has an estimated worldwide prevalence of 12- 33 million cases and is a major cause of morbidity and mortality in tropical countries. Pathogenesis of the disease depends on the virulence of the strain, hosts immune response and local protective factors. Spectrum of clinical disease with this organism can range from classical enteric fever to involvement of central nervous system, bone and joints, hepatobiliary system, genitourinary system and others. The development of antibiotic resistance in *S.typhi* poses a considerable threat of increased mortality and morbidity[1]. Until the mid-1970s Chloramphenicol was the drug for treatment of typhoid fever, till numerous outbreaks were reported from countries like Indian subcontinent, Southeast Asia, and Africa by strains of *S.typhi* resistant to Chloramphenicol[2].These multidrug-resistant *S.typhi* isolates were resistant to the usual first-line antibiotics, Chloramphenicol, Ampicillin, and co-trimoxazole, but remained fully susceptible to the fluoroquinolones and third-generation cephalosporin[3-4]. Due to an increase in drug resistant Typhi strains, fluoroquinolones and third generation cephalosporins were used increasingly to treat these infections. Now with emergence of resistance to fluoroquinolones, the challenge of treating Typhi infections appears to be getting more difficult every passing day[5]. Thus the present study was undertaken to study the current trend of antibiotic sensitivity pattern of Salmonella isolates from blood cultures during the period 2008-2010.

* To whom all correspondence should be addressed.
E-mail: preetimadan07@gmail.com

MATERIALS AND METHODS

A total of (8413+7896+7782) blood cultures were obtained in Microbiology department of RML hospital and PGIMER institute over a period of 3 years.

The samples were received either in conventional brain heart infusion broth which were incubated at 37 degree celsius overnight aerobically and subcultured next day on blood agar and MacConkey agar as per standard techniques and BacTAlert bottles which were subcultured only when it showed a positive signal.

The bacterial strains were identified based on morphology, biochemical reactions and serotyping with specific antisera (Central Research Institute, Kasauli, India). Antibiotic sensitivity was

performed using Kirby Bauer Disc Diffusion method[6]. The antibiotic discs used were ampicillin (10 µg), chloramphenicol (30 µg), trimethoprim/ sulphamethoxazole (1.25/23.75 µg), nalidixic acid (30 µg), ciprofloxacin (5 µg), ceftriaxone (30 µg), (manufactured by HiMedia, Bombay). The zone size interpretation was according to CLSI guidelines[6]. A standard strain of *Escherichia* coli (ATCC 25922) was used as quality control and included with each batch of tests.

RESULTS

A total of 24091 blood cultures were received during the study period, out of which cultures were positive in 1828(7.5%) and out of these 603(33%) isolates were *Salmonella.* Of these 517(28%) were Salmonella Typhi and 86 (4.7%) were Salmonella Paratyphi A. The antibiotic susceptibility testing of all *Salmonella* isolates revealed maximum sensitivity to Chloramphenicol (93%) followed by Cotrimoxazole (90%) and Ceftriaxone (89%). Sensitivity to Ofloxacin and Ciprofloxacin was 87%.Susceptibility to Nalidixic acid which represent quinolone group was 13%.

DISCUSSION

Typhoid fever is a major public health problem in our country. Although most infections are self-limited, causing acute gastrointestinal illness in humans, severe infections that spread to the bloodstream, meningeal linings of the brain, or other deep tissue can also occur and, antimicrobial agents are commonly prescribed to those seeking medical attention. The selection of effective antibiotics holds the key for effective treatment of invasive infections and has become more difficult as antibiotic-resistance has increased. Recent studies have shown increasing resistance to ciprofloxacin. Aztreonam was being implicated as a newer drug for typhoid treatment but discontinued after higher failure rate was reported. The results show resurgence of Chloramphenicol sensitive Salmonella (93%) was comparable to as being reported from other Indian studies. Selecting an appropriate antibiotic for treatment of typhoid fever and its complications requires knowledge of the susceptibility of locally isolated strains. Due to an increase in multidrug resistant S.typhi, fluoroquinolones and third generation cephalosporins have been increasingly used. Fluoroquinolones are usually avoided in the paediatric population on account of their potential to damage cartilage and tendon based on animal studies. The emergence and persistence of MDR and nalidixic acid-resistant serovar Typhi strains constitute a major problem across Asia. With increasing resistance to ciprofloxacin and the possibility of re-emergence of sensitivity to Chloramphenicol, the policy of empirical treatment of enteric fever needs to be rationalized. Use of Chloramphenicol may be associated with serious haematological complications. The current antimicrobial sensitivity profile that indicates increasing trend of Chloramphenicol sensitive strains, an extremely calculated decision requires to be taken as to whether Chloramphenicol can be considered as a candidate drug for treating serious complicated infections or some alternate strategies' require to be explored. We need to use our current drugs rationally in order to prevent further resistance. Improvement in public sanitation facilities, availability of clean drinking water, promotion of safe food handling practices and public health education are of immense value in prevention of resistant strains.

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