

Risk factors and antimicrobial susceptibility pattern in patients with culture-positive typhoid

Enteric fever is an endemic disease in developing countries such as India with *Salmonella enterica* var Typhi (*S. typhi*) and *S. enterica* var Paratyphi A (*S. paratyphi* A) being the major causative agents. Many risk factors have been studied such as poor sanitation, poor personal hygiene, large household size, close location to water bodies and travel to endemic areas. In addition, climatic factors such as rainfall, temperature and seasonal variations also affect the distribution of typhoid fever.¹ In recent years, changes in the epidemiology and drug susceptibility profile have been noted by various workers.² Re-emergence of susceptibility to conventional first-line antibiotics and reduced susceptibility to ciprofloxacin have been reported.² Moreover, resistance of *S. typhi* to third-generation cephalosporins, though low at present (1%) is emerging. Carbapenems and tigecycline may be alternatives, although clinical data are sparse. Few cases of extended-spectrum β -lactamase (ESBL) production in *S. typhi* have been reported from Asia.³

A total of 20 non-repeat *S. typhi* isolates, obtained from blood culture of patients suspected of having enteric fever between July 2016 and June 2017 were studied. Information related to clinical presentation, risk factors and demography were recorded. *Salmonella* isolates were identified biochemically and confirmed by serotyping. Antibiotic susceptibility was determined by the disk-diffusion method according to the Clinical and Laboratory Standards Institute guidelines.⁴ Nalidixic acid-resistant isolates were studied further. Screening for ESBL production was done by the double disc synergy method.⁵

Of the 20 cases (11 males and 9 females), 75% were children (≤ 14 years). Cases were reported throughout the year, with the majority (11, 55%) reported between March and May. Only 4 cases were reported between September and November; whereas, between June–August and December–February, only 3 and 2 patients, respectively, were diagnosed. All isolates were susceptible to first-line antibiotics, i.e. chloramphenicol, ampicillin and cotrimoxazole. This reversal may be due to either the emergence of *de novo* susceptible strains or loss of high molecular weight self-transferable

plasmid encoding chloramphenicol, ampicillin and cotrimoxazole resistance.^{6–8} We observed 95% resistance to ciprofloxacin, which can be attributed to the overuse of ciprofloxacin for treating enteric fever and other acute febrile illnesses. A concordance of 100% between susceptibility pattern of pefloxacin and ciprofloxacin was observed. We found no resistance to azithromycin and third-generation cephalosporins, which should be reserved for multidrug-resistant cases. None of the isolates was found to produce ESBLs. With the emerging resistance, the spread of ESBL-producing strains may limit therapeutic options with carbapenems and tigecycline as the last resort.

To conclude, the incidence of typhoid fever is influenced by climatic conditions. Enteric fever should be considered in cases of fever with thrombocytopenia, which may be a rare presentation. There is increasing resistance to fluoroquinolones, sensitivity to cephalosporins and re-emergence of sensitivity to ampicillin, chloramphenicol and cotrimoxazole in northern India. This re-emphasizes the necessity of continuous surveillance of antibiograms of *Salmonella* isolates to rationalize treatment protocols.

Conflicts of interest. None declared

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