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Pattern of Antibiotic Sensitivity in Enteric Fever: A Tertiary Care Hospital Experience

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Abstract

Objectives: *To describe the antibiotic sensitivity pattern ofSalmonella typhi and Salmonella paratyphi from blood culture specimens.*

Methods: *This cross-sectional study was done in the Department of Medicine, BIRDEM from July 2009 to June 2012. Standard laboratory and microbiological procedures were followed for blood culture and antibiotic sensitivity tests.*

Results: *Among the 97 blood culture positive samples, S. typhi was 71 (73.2%) and S. paratyphi was 26 (26.8%). Multi-drug resistant strains of S. typhi and S. paratyphi were 23 (32.4%) and 3 (11.5%) cases respectively. Azithromycin, nalidixic acid, ciprofloxacin, levofloxacin and amoxicillin resistance was also found in a good number of cases (S. typhi and S. paratyphi: 71.8% and 57.7%, 42.3% and 30.8%, 38% and 34.6%, 38% and 26.9% and 38% and 26.9% cases respectively). Nineteen (31.1%) of the 61ciprofloxacin sensitive organisms were resistant to nalidixic acid. Ceftriaxone was sensitive in 100% of S. typhi and S. paratyphi. Cefixim, ciprofloxacin, levofloxacin, imipenem were among the most common sensitive antibiotics (S. typhi and S. paratyphi: 83.1% and 73.1%, 62% and 65.4%, 53.5% and 65.4%, 76.1% and 65.4% cases respectively).*

Conclusion: *Ceftriaxone was the most sensitive antibiotic for treating enteric fever followed by cefixim, imipenem and ciprofloxacin. However, in suspected cases of enteric fever, blood culture should be requested before prescribing antibiotic.*

Key words: *Antibiotic, resistance, sensitivity, enteric fever.*

Introduction

Enteric fever (Typhoid fever) is a common febrile illness especially in developing countries. The estimated global incidence in the year 2000 was 21,650,974 with 216,510 deaths.[1] In the endemic areas, annual incidence is approaching 1%.[2] In Bangladesh, typhoid fever is not only a problem for patients, but also for physicians, because patients often present to medical care after taking one or more antibiotics by themselves or according to advice of pharmacists, resulting in no growth of *Salmonella typhi* or *paratyphi*in blood cultures.[3] Indiscriminate and injudicious use of antibiotics in undiagnosed febrile illness is responsible for diagnostic difficulties and antibiotic resistance in typhoid fever.[3] It is reported that more than half of enteric fevers are due to multi-resistant strains of *S. typhi*or *paratyphi*, moreover resistance to quinolones and cephalosporins are also increasing in Bangladesh.[4-6] So, empiric prescription of antibiotics for suspected typhoid fever does not remain uniform, rather isolation of organism and identification of antibiotic sensitivity is desirable before starting antibiotic treatment. In this current study, we have tried to evaluate antibiotic sensitivity patterns of *S. typhi and S. paratyphi* in our setting.

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Methods

This cross-sectional observational study was done in the Department of Medicine of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) from July 2009 to June 2012. Hospitalized adult febrile patients of either sex with a clinical diagnosis of typhoid fever were initially selected for the study purpose. Blood samples were sent for cultures, and sensitivity tests were done following standard disc diffusion method according to National Committee for Clinical Laboratory Standards (NCCLS) guidelines.[7] Patients with a growth of *S. typhi* or *paratyphi* from blood cultures were finally included in this study and those who did not show any growth of *S. typhi* or *paratyphi* were excluded.

Results

Over the study period, a total of 97 patients, who had a growth of *S. typhi or paratyphi* from blood culture samples were included for analysis. Mean age of the study population was 39.7 (range 19-67) years. Male were 61 (62.9%) and female were 36 (37.1%). Common co-morbidities were diabetes mellitus (65, 67%), hypertension (33, 34%) and dyslipidaemia (32, 32.9%). Of the isolated bacteria, 71 (73.2%) were S. typhiand rest 26 (26.8%) were S. paratyphi A. No S. paratyphi B was isolated. Multi-drug resistant strains of S. typhi and S. paratyphi were found in 23 (32.4%) and 3 (11.5%) cases respectively. Many bacterial isolates were resistant to azithromycin, amoxicillin, nalidixic acid and ciprofloxacin (Table I). Nineteen (31.1%) of the 61ciprofloxacin sensitive organisms were resistant to nalidixic acid. Regarding antibiotic sensitivity, ceftriaxone was sensitive to all S. typhi and S. paratyphi isolates. Other sensitive antibiotics were cefixim, amoxicillin, cephalexin, imipenem and chloramphenicol (Table I).

Table-I

Antibiotic sensitivity and resistance pattern of S. typhi and S. paratyphi

Antibiotic	S. typhi Sensitive	N (%)71 Resistant	S. Paratyphi Sensitive	N (%)26 Resistant
Amoxicillin	41 (57.7)	27 (38)	17 (65.4)	7 (26.9)
Ampicillin	43 (60.6)	26 (36.6)	18 (69.2)	7 (26.9)
Azithromycin	20 (28.2)	51 (71.8)	11 (42.3)	15 (57.7)
Cefixime	59 (83.1)	12 (16.9)	19 (73.1)	7 (26.9)
Ceftriaxone	71 (100)	0 (0)	26 (100)	0 (0)
Cephalexin	46 (64.8)	19 (26.8)	17 (65.4)	6 (23.1)
Chloramphenicol	41 (57.7)	28 (39.4)	19 (73.1)	5 (19.2)
Ciprofloxacin	44 (62)	27 (38)	17 (65.4)	9 (34.6)
Co-trimoxazole	45 (63.4)	23 (32.4)	22 (84.6)	3 (11.5)
Imipenem	54 (76.1)	6 (8.5)	17 (65.4)	4 (5.6)
Levofloxacin	38 (53.5)	27 (38)	17 (65.4)	7 (26.9)
Nalidixic acid	34 (47.9)	30 (42.3)	17 (65.4)	8 (30.8)
Ofloxacin	39 (55)	26 (36.6)	17 (65.5)	6 (23.1)

*not all samples were tested against all antibiotics listed

Discussion

The introduction of chloramphenicol for the treatment of typhoid fever in 1948 transformed a severe, debilitating and often fatal disease into a readily treatable condition.[8] In spite of reported resistance within 2 years of its introduction, chloramphenicol resistance was not a major problem until 1972.[9] After that, large number of antibiotics lost sensitivity to Salmonella species mostly because of their irrational use.[3]

In this current study we found that significant number of cases were multi-drug resistant, which is much lower than previous studies.[2,4,5] One explanation might be that, as 1st line drugs are not used in enteric fever because of high resistance rate,so they are regaining their sensitivity. Not a single patient was resistant to ceftriaxone in our study although ceftriaxone resistance has been reported from Bangladesh.[5,6] Significant number of patients were resistant to azithromycin as seen in other studies.[10] Its dosing convenience, easy availability and non-judicious use in non-specific febrile illness might be the contributory factor behind it.

Ceftriaxone was sensitive in 100% cases in this study as seen in another study.[5] Cefixim, ciprofloxacin and levofloxacin were sensitive in significant number of cases, but much lower than previous studies.[11] Nalidixic acid resistance is increasing. It is recommended that ciprofloxacin, in contrary to previous statements, should no longer be used if the organism is resistant to nalidixic acid.[3,5]

Our study had some limitations. In all samples, sensitivity to all 1st line antibiotics were not tested. Growth of organisms and their antibiotic sensitivity could be compared between diabetic and non-diabetic patients. It would have been better, if patients could be grouped according to locality where they reside, so that local antibiotic resistant pattern could be described.

In conclusion, it can be said that ceftriaxone is the most sensitive antibiotic for salmonella species. But resistance to other cephalosporins, azithromycin and quinolones are increasing. So, it might be recommended that blood cultures should be sent before prescribing antibiotics in suspected enteric fevers to prevent further resistance.

Conflict of Interest: None

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