



Original Research Article

Emergence of Drug resistance of salmonella Species, in and around Patna

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Abstract

Objective: The aim of the present study was to determine the incidence of salmonella species and their emerging trends of drug resistance.

Materials and Methods: A total of 96 patients of different age groups and different sex were presenting with complains of high grade fever from 4 to 6 days of duration, severe headache and abdominal pain in medical OPD, were included in the study. After detailed history specially drug history and clinical examination, they were provisionally diagnosed as a typhoid fever. All the suspected typhoid fever patient's were send to the laboratory for blood culture. Samples were collected in fully aseptic manner. Isolation, Identification and Drug sensitivity pattern of the causative organism were performed according to CLSI guidelines.

Results: Out of 96 patients, 52 (54.17%) patients were comes in 5-20 years of age, which was the commonest and with male preponderance (61.54%). Female to male ratio was 1:1.52. In the present study a total of 72 (75%) isolates obtained from blood culture, they were highly sensitive to chloramphenicol (86.12%), Ampicillin (86.11%), and cotrimoxazole (86%). Highest sensitivity was seen for cephalosporins, followed by Quinolones, 6.95% of the strains to be sensitive to all the drugs and 15.28% were multidrug resistance(MDR).

Conclusion: Study indicates reemergence of chloramphenicol susceptible salmonella species.

Keywords: Salmonella, Drug resistance, Typhoid fever, Reemergence, Susceptible.

Introduction

Enteric fever is prevalent worldwide and continues to be a major public health problem in developing world with highest annual incidence of 33 million cases. Almost 80% of cases and death are in Asia and rest occurs mostly in Africa and Latin America. Regions with the highest incidence of enteric fever (>100 cases per 10, 00, 00 persons per year) are south central Asia and Southeast Asia. In Delhi, (India) the incidence of enteric fever is 9.8 cases per 10, 00 person years. In Bihar incidence is high.

Typhoid is a systemic disease caused by salmonella typhi and salmonella paratyphi A. Emergence of multi-drug resistance to ampicillin, chloramphenicol and cotrimoxazole has further complicated the treatment and management of enteric fever. In India antibiotic resistance has been reported since 1960 and the first outbreak of multidrug resistant S. typhi (MDRST) was reported in Calicut. The incidence of multidrug resistant (MDR) was reported to be as high as 92%, while there is recent reports notice a decline to 22% from the same region. During the period

between 1990 and 1992 salmonella isolates were uniformly resistant to chloramphenicol, ampicillin, cotrimoxazole and tetracycline. Subsequently during the years 1993- 1997, 30-35% regained susceptibility to these drugs. These developments had left fluoroquinolones as the only choice of treatment of typhoid fever rampant use of ciprofloxacin not only for typhoid but also for other infection gradually led to increased minimum inhibitory concentration (MIC) of salmonella typhi to ciprofloxacin. There are reports of clinical failure after treatment with ciprofloxacin. Fluoroquinolone resistance is being reported with increasing frequency from all over the world from 2000. There have been reports of high levels of chloromphenical susceptibility from many parts of India and salmonella stains have regained susceptibility to this drug due to less use. Present study was under taken to evaluate the efficacy of chloramphenical and other fist-line drugs as against the quinolones and cephalosporins which were used for the empirical treatment of enteric fever.

Materials and Methods

Present study was conducted in the Department of Pharmacology, Patna Medical College, Patna, with the help of Department of Microbiology, during the periods of September 2016 to October 2018. A total of 96 patients of different age groups and different sex were presenting with complains of high grade fever from 4 to 6 days of duration, severe headache and abdominal pain in medical OPD, were included in the study. After detailed history specially drug history and clinical examination they were provisionally diagnosed as a typhoid fever. All the suspected typhoid fever patient's were send to the laboratory for blood

culture. A total of 96 blood samples were collected aseptically for blood culture which was provisionally diagnosed as enteric fever. All the samples were inoculated on BHI broth and after growth they were subculture on blood agar, mac.conkey's agar, XLD media, and wilson and blair bismuth sulphide medium. S.typhi and S. Paratyphi A were isolated and identified by standard procedure according to CLSI guidelines. Drug sensitivity testing (DST) was carried out by kirby-bauer disc diffusion method. Antibiotics used in this study were chloramphenicol, Ampicillin, cotrimoxazole, ciprofloxacin, ofloxacin, nalidixic acid, ceftriaxone, cefixime, cefotaxime and Azithromycin, supplied by Himedia laboratories, Mumbai.

Results

Out of 96 patients, 52 (54.17%) patients were comes in 5-20 years of age, which was the commonest and with male preponderance (61.54%). Female to male ratio was 1:1.52. In the present study a total of 72 (75%) isolates obtained from blood culture, in which 51(70.84%) isolates are S.typhi and 21(29.16%) isolates are S.paratyphi A. Antibiogram of salmonella typhi showed 5 (6.95%) strain to be sensitive to all the drugs tested. Resistance pattern varied resistance to single to six of the antimicrobial agent. 10(13.89%) isolates showed resistance to ampicillin alone, 36 (50%) to nalidaxic acid (NARST), 8 (11.12%) to two antibiotics, 2(2.78%) to three antibiotics and 11(15.28%) were MDR (multi-drug resistance)

The antimicrobial drug sensitivity showed highest sensitivity to cephalosporins followed by quinolones and azithromycin. 62(86.12%) of the isolates were sensitive to chloromphenical.

Table-1 Shows age distribution of patients.

Age group of patients in years	Total no. of patients included in study	percentage
5-20	52	54.17
21-40	31	32.3
41-60	10	10.41
More than 60	3	3.12
Total	96	100

Table-2 Shows sex distribution in different age group of patients

Age of patients in years	Male		Female	
	Total no. of patients	percentage	Total no. of patients	percentage
5-20	32	33.34	20	20.84
21-40	19	19.79	12	12.5
41-60	4	4.16	6	6.25
More than 60	3	3.12	0	00
Total	58	60.41	38	39.59

Table-3 Shows distribution of patients according to clinical diagnosis

Clinical diagnosis	Total no. of patients included in study	Total no. of patients included in study
Prolonged fever101.8-104.9F	82	85.41
Headache	88	91.67
Abdominal pain	40	41.67
Chills	33	34.37
Myalgia	19	19.8
Anorexia	50	52.08
Nausea & vomiting	20	20.83
Diarrhea	28	29.16
Constipation	16	16.67

Table-4 Shows hematological parameter of patients

Hematological parameter	Total no. of patients included in study	Percentage
Normal hemogram	6	6.25
Anemia	12	12.5
Leucocytosis with relative lymphocytosis	78	81.25

Table-5 Shows Isolation of Salmonella spp. In blood culture

Organism Isolated (n=72)	Total no. of blood samples collected. (n=96) (Growth=72,75%)(NG=24, 25%)	Percentage
S.Typhi	51	70.84
S.Paratyphi A	21	29.16

Discussion

In the present study S.Typhi and S. Paratyphi showed significant increase in sensitivity to chloramphenical (86.12%) ,ampicillin (86.11%), cotrimoxazole (86%), the fist line drugs for enteric fever. A study from kolkata and Chennai has indicated similar sensitivities. Dutta et al have also reported a remarkable reversal in the resistance pattern of S. Typhi in Kolkata. Multi drug resistance is still very common in Salmonella typhi, although it is decline with increased use of fluroquinolones and Cephalosporins for the treatment. There was decline in the MDR strains (18.34%) found in our study, compared with earlier reports, indicating up to 92% of multi drug resistance

The quinolones emerged as useful drugs for the treatment of MDR cases of Typhoid infection. Previous study has shown resistance to Ciprofloxacin in 21.4% of the cases and 18.1% of the cases. Nalidixic Acid susceptibility has been validated as a screening test for reduced susceptibility to Ciprofloxacin and Nalidixic Acid is associated with a high MIC of Ciprofloxacin, which is associated with treatment failure. In our study about 2% isolates were resistance to Ciprofloxacin and 22% showed decreased susceptibility to Ciprofloxacin. Quinoilones resistance is due to altered DNA gyrase sub-unit but, recently, plasmid mediated quinolones resistance has also been reported and so is significant in transmission in resistance.

In the recent past, cephalosporins is the major drugs for the treatment of Enteric fever. Third generation cephalosporins like Ceftriaxone iv/im, Cefixime per oral effective in Typhoid fever even for NAR infection. Among the drug Cefixime have 100% sensitivity index. Although there was no resistance to caphalosporins. This has also been observed by other workers.

Conclusion

Emergence of drug resistance is due to wide spread availability and indiscriminate or uncontrolled use of antibiotic, public health measures and education programs are limited by finances and typhoid fever is endemic. In case of Quinolones (Ciprofloxacin, Ofloxacin, Levofloxacin) moderate cost, advantage of oral route, tolerability and convenient dosage schedule have contributed towards its indiscriminate use . The present study encourages the re introduction of Chloramphenicol in the treatment of Typhoid fever.

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