Original Article

Blood Culture Isolates and Antibiogram of Salmonella: The Gathering Storm

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Abstract

Introduction: *Typhoid fever is a common problem all over the world including Bangladesh. It is caused by salmonella typhae and paratyphae and it is an old infectious water born disease. It is encountered in Bangladesh throughout the year. For many years it is treated by Chloramphenicol and subsequently Co-trimoxazole and Amoxicillin. Despite the use of newly developed antibacterial drugs, enteric fevers caused by multidrug-resistant bacterial strains are one of major health problems in Bangladesh. Multidrug resistant Salmonella sp. has been emerged is a cause of concern.* ***Materials and Methods:*** *This is a retrospective study done at the Popular Medical College Hospital over a period of 6 months between January 2018 to june 2018.* ***Results:*** *During the study period, total 115 cases were enrolled. Regarding antibiotic sensitivity pattern, 69% strains were sensitive to Ampicillin, 100% to Cefixime and Ceftriaxone, 75% to Cotrimoxazole, 52% to Nalidixic Acid and 68% to Ciprofloxacin, 69% to Levofloxacin, 80% to Cholarphenicol.* ***Conclusion:*** *Ceftriaxone and Cefixime were found to be highly sensitive. So, we should be very careful for the judicious use of these valuable drug to prevent drug resistance.*

Keywords: *Chloramphenicol, Cotrimoxazole, Amoxicillin, Salmonella.*

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Introduction

In early 1970s, emergence of plasmid-mediated chloramphenicol resistance was reported and the effectiveness of chloramphenicol as a first-line drug decreased gradually by outbreaks caused by resistant strains in countries as far apart as Mexico and India. Outbreaks occurred in Vietnam, Indonesia, Korea, Chile and Bangladesh in the next five years.[1]

Salmonella typhi (S. typhi) developed resistance to cipropfloxacin and other fluoroquinolone along with other conventional antibiotics as reported in different parts of the world and emerged as new challenges to the treatment of typhoid fever.[2] It was reported that, in Bangladesh third generation cephalosporins (ceftriaxone and cefixime) are still the effective drugs for treating typhoid fever if used in proper dose and duration. Though azithromycin is prescribed as an alternative to ciprofloxacin in resistant cases, recently it has lost the credibility due to the emergence of resistance.[3]

According to records of the public and private hospitals, enteric fever is a major infectious disease occurring at high fluctuating incidences all over Bangladesh.[4]

Vaccination, access to clean water, and improved sanitation are effective means to prevent typhoid. Antibiotics are also vital to the treatment of typhoid, but antibioticresistant S. Typhi strains have become increasingly prevalent.[5]

The present study was undertaken to re-evaluate the trends of antibiogram of Salmonella typhi isolates, so that therapeutic value of common can be rationalized in the treatment of typhoid fever.

Materials and Methods

A retrospective analysis of laboratory records from Popular Medical College microbiology laboratory was carried out.

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During 6 months study period from January 2018 to June 2018, total 2262 febrile patient from in-patient and outpatient from Inpatient and outpatient departments of Medicine of PMCH and private chambers were enrolled.

After taking antiseptic measures 5-10 ml venous blood was collected from each patients and innoculated in tryptica soya broth or automated blood culture machine (BACTEC, Becton Dickinson). Subculture was done on blood agar and Mac Conkey's agar media. Salmonella typhi were identified by observing pale colonies on Mac Conkey's agar media and biochemical tests such as negative oxidase, urease and indole, alkaline slant and acid butt in TSI media with production of H2S, negative citrate utilization test and positive motility test. Final species were identified by specific antisera. Antimicrobial susceptibility test was done by the disc diffusion method (Kirby-Bauer technique) using Mueller Hinton agar media following CLSI.

Those who are resistant to Ampcillin, chloramphenical and trimethoprim-sulfamethoxazole are considered to be Multi drug resistant Salmonella typhi

Results

Over the study period total no of blood sample was 2262.Culture positive was found 231samples. Among them Salmonella typhi was found 115 samples.37% cases in the age group 15-30 years, 47% cases in the age group 31-45 years, 11% cases in the age group 46-60 years and 5% more than 60 years of age. (Table I) There was male 65% predominance.(Table II) Regarding antibiotic sensitivity pattern, 69% strains were sensitive to Ampicillin, 100% to Cefixime and Ceftriaxone, 75% to Cotrimoxazole, 52% to Nalidixic Acid and 68% to Ciprofloxacin,69% to Levofloxacin, 80% to Chloramphenicol. MDRST (Multidrug Resistant Salmonella Typhi) was found 30% . (Table III)

Table I:

Age	Percentange
15 - 30	37%
31-45	47%
46-60	11%
>60	5%

Table II:

Gender	percentage
Male	65%
Female	35%

Table III:

Name of the antibiotic	Percentage of sensitivity
Cefixime	100%
Ceftriaxone	100%
Chloramphenicol	80%
Cotrimoxazole	75%
Levofloxacin	69%
Ampicillin	69%
Ciprofloxacin	68%
Nalidixic acid	52%

Discussion

Enteric fever is still a significant public health problem in many developing countries. It is a dreaded disease because of its long course and associated complications if not detected and treated early. There are reports of changing clinical features in typhoid fever caused by drug resistant S. Typhi leading to difficulty in clinical diagnosis.[6,7]

Chloramphenicol for the treatment of typhoid fever was introduced in 1948. But chloramphenicol resistance was not a major problem until 1972. After that, large number of antibiotics lost sensitivity to Salmonella species mostly because of their irrational use.[8]

In this current study we found that significant number of cases were multi-drug resistant, which is much lower than previous studies. 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.[9]

Ceftriaxone and cefixime was sensitive in 100% cases in this study as seen in another study.[10] 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.[12]

The Sindh outbreak S. Typhi encodes resistance to all the main antimicrobials that have been considered first-line drugs to treat typhoid fever during the past 70 years, including chloramphenicol, amoxicillin, ampicillin, TMP-SMZ, ciprofloxacin and other fluoroquinolones (e.g., ofloxacin), and ceftriaxone, and according to Klemm et al., it should be considered an XDR S. Typhi strain.[13]

The theoretical fallback antibiotics would then be expensive parenterally administered antimicrobials, such as carbapenems (imipenem-cilastatin combination, meropenem, ertapenem) and tigecycline (a glycylcycline). While these drugs represent options for treating patients in industrialized countries, their cost would be prohibitive for routine use as first-line drugs to treat typhoid fever cases in developing countries.Enteric fever cases in near can be virtually untreatable if they are caused by emergent H58 haplotype XDR strains. This would turn the clock back to the pre-1948 era, when typhoid fever was not treatable. Now is the time for global action to prevent a "gathering storm" from becoming a "perfect storm" and an enormous public health crisis.[14]

Conclusion

In conclusion, it can be said that ceftriaxone and cefixime is the most sensitive antibiotic for salmonella species. So dependence is now on third generation cephalosporin and it is a reserve drug for treating Multi drug resistant Salmonella typhi (MDRST) and ciprofloxacin resistant cases.So, Judicious use is mandatory to prevent emergence of resistant strains.

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