NEED FOR EARLY DETECTION OF EMERGING SALMONELLA PARATYPHI A INFECTION

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ABSTRACT

The study was undertaken to find out the prevalence and Antibiotic sensitivity pattern of Salmonella typhi and paratyphi A, B, and C from patients presenting with fever at Katuri Medical College & Hospital in Guntur. A total of 569 blood samples were collected for culture during a period of Fourteen months (JAN 2015 to FEB 2016) were included in the study. Out of total samples received 137 (24%) were positive for Enteric fever. The growth positive rate in two genders (M: 63.5% and F: 36.4%) was not statistically significant (P>0.05). Several recent reports showed an increasing incidence of S.paratyphi A causing enteric fever. The occurrence of enteric fever infections was high in rainy season which may be due to improper drainage and sanitation. In the present study we investigate the age and sex group of patients, and more sufferers from this disease preferable adults and males are more prone to this disease.

KEYWORDS

Blood Culture, Emerging, Enteric Fever, Prevalence, S.paratyphi A.


INTRODUCTION

Enteric fever is caused by a Gram negative bacilli Salmonella enterica serovar Typhi and by S. Paratyphi A, B or C. The disease remains an important public health problem in developing countries. Little is known about the causes of enteric fever in Asia. Salmonella enterica serovars Typhi and Paratyphi A are human host-restricted pathogens. Enteric fever is a global disease affecting 13.5 million individuals each year.[1] Incidence and case fatality rate is low when compared to the developed countries.[2] The global incidence is estimated to be 21 million with 700,000 deaths each year primarily in South East Asia, Africa and Latin America.[3] attributed to rapid population growth and unplanned urbanization, inadequate and improper waste disposal, lack of potable water supply. In the past, paratyphoid fever was believed to cause a milder disease than typhoid fever, but increasing isolation rates of S. Paratyphi A has also been reported from India.[4] However, rapid diagnostic tools are still not generally available. This contributes to lack of accurate epidemiological data and much empirical and often inappropriate treatment. Because of indistinguishable clinical features between S typhi and S paratyphi disease and public health concerns, diagnostic tests were developed to identify the etiologic agent. Transmission of the infection is by faecal-oral route, when contaminated food or water is consumed and close contact with acutely infected persons or with a chronic typhoid carrier.[5] The infectious dose for S typhi is estimated as >1,000 organisms orally.[6][7] Though antimicrobial therapy markedly reduces the morbidity and mortality, emergence of resistance to first line antibiotics poses challenge in its management.[8]

Currently available typhoid vaccines do not protect against S paratyphi A, and it appears that S paratyphi A is an emerging problem.

The aim of the study was to determine the prevalence of salmonella para typhi A infection fever and highlighted the extent to which individuals of different age and gender among the studied population were infected. This is with intention of creating awareness among public, local and regional authorities to allow them to take effective measures for prevention and control of the infection.

MATERIAL AND METHODS

A total of 569 blood samples were collected from patients with fever visiting Katuri Medical College Hospital, Guntur, India during January 2015 to Feb 2016. Institutional Ethical committee clearance was obtained and consent of the patients was taken. An Evidence - based clinical diagnosis of Enteric Fever cannot be made as the presentations are nonspecific. It requires isolation of S. paratyphi or S. typhi from blood, stool, urine. Blood culture is the mainstay diagnosis of Enteric Fever. Bone marrow culture is more sensitive and gives positive results in up to 80 to 95% of the case even when the patient has already been on antibiotics. It has the disadvantage of being an invasive procedure.[9] Data was collected regarding basic information like age, sex & Seasonal variation. From the persons with fever, We collected 5-10 ml of blood from adults in to BHI (Brain heart infusion biphasic medium) bottles. The bottles were incubated at 37°C for 7-10 days and visually checked for growth every day. Bottles were subcultured on MacConkey agar on days 1, 2, 4 and 7 or when turbidity was detected. Biochemical reactions were done, suggestive of salmonella were confirmed serologically by agglutination test with polyvalent and monovalent antisera.[10]

S. typhi and paratyphi A isolates were subjected to antimicrobial susceptibility testing by Kirby- Bauer’s disk diffusion technique using Muller Hinton Agar. Antibiotic discs used in this study included amoxicillin (10 mcg), chloramphenicol (30 mcg), cotrimoxazole (25 mcg), ciprofloxacin (5 mcg), ofloxacin (5 mcg), ceftriaxone (5 mcg),
ceftaxime (5 mcg).

The sensitivity and resistance results of the tested isolates were recorded following the instructions of the disk manufacturer. The results were analysed statistically by Chi-square test ($X^2=0.012, P >0.05$).

**RESULTS**

Of the total 569 blood samples cultured, 137 (24%) were positive for S. typhi and paratyphi A. Out of the total positive samples, 102 (74.4%) were S. typhi and 35 (25.5%) were S. paratyphi A. S. paratyphi B and C were not isolated. The overall growth positive rate was relatively higher in male (63.5%) compared to female (36.4%). Growth positivity of S. typhi (M: 62.7% and F:37.2%) and paratyphi A (M: 65.7% and F:34.2%) was observed in both sexes. Age and sex distribution of salmonella paratyphi A isolates depicted in Table 1.

The occurrence of enteric fever was higher in rainy season. S. typhi was found to be most sensitive to Cefotaxime followed by Ceftriaxone, Ofloxacan, Co-Trimoxazole and chloramphenicol. It was least sensitive to Amoxicillin followed by Ciprofloxacin. S. paratyphi A also was found to be most sensitive to Cefotaxime followed by Ceftriaxone. Co-Trimoxazole and Chloramphenicol were least sensitive to Amoxicillin followed by Ciprofloxacin and Ofloxacan.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No. of Patients</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
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<tbody>
<tr>
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<td>01</td>
<td>0</td>
<td>0</td>
<td>01 (2.8%)</td>
</tr>
<tr>
<td>11-20</td>
<td>08</td>
<td>04</td>
<td>12 (34.2%)</td>
<td></td>
</tr>
<tr>
<td>21-30</td>
<td>10</td>
<td>05</td>
<td>15 (42.8%)</td>
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</tr>
<tr>
<td>31-40</td>
<td>02</td>
<td>02</td>
<td>04 (11.4%)</td>
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</tr>
<tr>
<td>41-50</td>
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<td>01</td>
<td>02 (5.7%)</td>
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<td>&gt;50</td>
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<td>0</td>
<td>01 (2.8%)</td>
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</tr>
</tbody>
</table>

**Table 1: Age and sex distribution of Salmonella Paratyphi A isolates (n = 35)**

**DISCUSSION**

Enteric fever is a major public health problem in our country. Proper sanitation, public health education & vaccination are long term preventive measures that would improve this sanitation. A total of 569 patients with fever, that presented to Department were screened for Enteric fever. A total 137 were positive for enteric fever. Males were more infected than females with M: F ratio of 1.74:1. This might be due to our cultural background where male is more likely to report to hospital, at the same time more likely to contract infection due to more outdoor activities. In this study Adults are more suffering from disease because of increased exposure to outside food habits and water. Prevalence of Paratyphoid A was found to be 25.5% (Fig 1). Similar prevalence was found in a study carried out in India 24% & 23.5% in Calcutta from September 2003 to August 2010). Considering the changing drug sensitivity pattern (Sensitive to resistance and vice versa) it is advisable to do continuous evaluation of sensitivity-resistance pattern of isolates as to make rational use of antibiotics in the management of enteric fever cases in future.

**Fig. 1: Seropositivity rate of enteric fever**

**CONCLUSION**

Occurrence of Salmonella typhi and Salmonella paratyphi A is increasing which may be due to increased drug resistance. In China and India, countries with the largest populations in the world, S. Paratyphi A is the causal agent for a substantial proportion of enteric fever episodes that cannot be distinguished clinically from typhoid fever episodes. While similar treatment strategies may work for both organisms, future enteric fever prevention strategies in Asia must focus on S. Paratyphi A as well as on S. Typhi, especially when considering the emergence of drug-resistant strains. Majority of cases were seen in adults in our study who should be identified as high risk group. Health education of people and in cases of children, educational status of parents especially mothers should be increased through adult education classes. More number of cases were seen in monsoon season which may be due to improper drainage and sanitation. The perception that a small proportion of enteric fever cases are caused by S. Paratyphi A is probably no longer true in many regions of Asia, especially in south east China, where S. Paratyphi A is already more frequently isolated than is S. Typhi. This finding could be signalling the emergence of S. Paratyphi A as a pathogen. Previous reports from vaccine trials have shown successful control of S. Typhi but no changes in the incidence of S. Paratyphi A. Future vaccination strategies should include bivalent vaccines that protect against S. Typhi as well as S. Paratyphi A.

Although improved water quality and sanitation constitute ultimate solutions to this problem, vaccination in high-risk areas is a potential control strategy recommended by WHO for the short-to-intermediate term. Therefore, typhoid vaccination has to be implemented as a routine public health measure in typhoid-endemic countries. In addition to these measures Health regulations governing the business should be implemented to limit unhygienic practices by food sellers.
REFERENCES


