

Short Communication

An Outbreak of typhoid fever in a Sainik school of Rural Maharashtra

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Abstract

Introduction – Typhoid fever is virtually eliminated from developed countries due to public awareness, good hygiene practices and improved water supply. But it continues to be a health hazard in developing countries like ours.

Material & methods – In the month of August, 2012; total 16 blood samples from indoor pediatric patients were received in the Microbiology department. The following test were done on the samples – HIV antibody tests by Tridot, Serum hepatitis surface antigen (HBsAg) test, malarial parasite antibody detection by immuno chromatographic test (ICT), peripheral blood smear for malarial parasite, blood culture and antibiotic sensitivity test and Widal test. Throat swabs and stool samples of the patients were also processed. Department of Preventive & Social Medicine was informed about the outbreak. All preventive measures were taken to control the outbreak.

Result – Out of 16 blood samples, *Salmonella Typhi* was grown on culture in 5 and Widal test was positive in 4. All the strains of *Salmonella Typhi* were sensitive to ampicillin, ceftazidime, ciprofloxacin, gentamicin, tetracycline, chloramphenicol and Cotrimoxazole except nalidixic acid. Further spread of the disease was checked by adopting immediate prevention and control measures, e.g., health education, provision of safe drinking water, improvement of hygiene, safe food handling practices etc.

Conclusion – Typhoid fever is still a major health problem in developing countries. Prompt diagnosis, treatment and immediate preventive measures are important to avoid a major outbreak.

Keywords: Typhoid; *Salmonella*; Outbreak

1. Introduction

Etiological agent of typhoid fever is *Salmonella enterica* serovar Typhi (*S.Typhi*).¹ In India, approximately 102 to 2219 per 100,000 of the population is affected from typhoid fever.² Sometimes, diagnosis of typhoid fever in children becomes difficult due to atypical clinical presentations.^{3, 4} At present, no vaccine of typhoid fever is available for children under 2 years of age.⁴ Besides, 6% - 21% cases occur under 2 years of age.⁵

Here, we report an outbreak of typhoid fever in a Sainik School of Maharashtra, on 2nd week of August' 2012. Out of 16 pediatrics patients, 9 were confirmed as cases of typhoid fever by culture and/or serological tests. By prompt diagnosis and treatment and immediate application of preventive measures, a major outbreak was avoided.

2. Material & Methods

Blood samples from the patients were processed in the microbiology laboratory. All the patients were investigated against HIV antibody (screening test by Tridot), serum hepatitis surface antigen (HBsAg), and malarial parasite antibody detection by ICT malarial parasite, peripheral blood smear for malarial parasite and Widal test. 3 ml of pediatric patients' blood were also incubated in brain heart infusion broth containing blood culture bottles and after 18 – 24 hours incubation, sub cultured on blood agar, MacConkey's agar and deoxycholate citrate agar media. Growth on culture plates were further tested by biochemical test and confirmed by slide agglutination tests using appropriate antisera. For confirmation of *S. Typhi* isolates, antisera against lipopolysaccharide antigens O9, O12 and protein flagellar antigen Hd were used. Stool culture & culture from throat swab were also done on MacConkey's and blood agar. Antibiotic susceptibility tests were done using following antibiotic disks: ampicillin, ceftazidime, ciprofloxacin, gentamicin, nalidixic acid, tetracycline, chloramphenicol and Cotrimoxazole.⁶ All media and antibiotic disks were procured from Hi Media Pvt Ltd, India.

Confirmed typhoid cases were reported to preventive & social medicine department. Judicious use of antibiotics, improvement of sanitation, purification of drinking water, introduction of safe food handling practices and health education of involved persons were done.

3. Results

Among 16 students admitted from Sainik school complaining of fever, 5 (31.25%) were found to be positive for growth of *S. Typhi* and 4 (25%) were having positive Widal test (Table – 1). All the patients were non reactive to HIV screening test and negative for malarial parasites. One was positive for HBsAg surface antigen. Throat swab and stool samples of all 16 cases showed growth of normal commensal. Antibiotic sensitivity of 5 isolates of *S. Typhi* showed similar results, i.e., sensitive to ampicillin, ceftazidime, ciprofloxacin, gentamicin, tetracycline, chloramphenicol and Cotrimoxazole. All isolates were resistant to nalidixic acid. Immediate preventive measures such as basic education, improvement of hygiene and purification of drinking water successfully controlled the outbreak.

Table 1: Shows blood culture and Widal test positivity among typhoid fever patients. (n = 16)

Number of cases	Growth on blood culture	Widal test (TO & TH)
1	<i>S. Typhi</i>	Negative
2	<i>S. Typhi</i>	Negative
3	<i>S. Typhi</i>	Negative
4	<i>S. Typhi</i>	Negative
5	<i>S. Typhi</i>	Negative
6	No growth	TO=1/320, TH= 1/640
7	No growth	TO=1/160, TH=1/320
8	No growth	TO=1/320, TH=1/640
9	No growth	TO=1/320, TH= 1/640
Total (Percentage %)	5 (31.25%)	4 (25%)

4. Discussion

Typhoid fever is regularly reported from various parts of India. There are 10% chances of complication in untreated cases and 1% in treated cases.⁷ In India, incidence rate of typhoid fever is declining but sporadic incidences continue to occur in several places of the country.^{2,3,8}

Between the periods 13.08.2012 to 16.08.2012, sixteen students of a sainik school admitted in the pediatric ward of Pravara rural hospital. The Sainik School was situated in a rural area of western Maharashtra. All of them were complaining of fever & malaise. 5 of them were having loose motion. All the patients were residing in the school campus continuously for more than one month. Students were not allowed to eat outside street food. Blood samples, stool samples and throat swabs from the patients were sent to microbiology department.

Out of 16 blood samples, 5 were positive for growth of *S. Typhi* & another 4 showed significant titre of O & H

antigen in Widal tests (Table 1). Being a boy's school, all the patients were male and of 5 to 14 years age group. No sex difference or seasonal variation had been observed for typhoid fever by most of the workers.⁹ Anand et al from Rajasthan reported an outbreak of typhoid fever, in which, maximum no of cases (276/1000 population) was found in 10 to 14 years age group.¹⁰

All our isolates were sensitive to ampicillin, ceftazidime, ciprofloxacin, gentamicin, tetracycline, chloramphenicol and cotrimoxazole and resistant to nalidixic acid. There are increasing incidence of multidrug resistant (MDR) *S.Typhi* infection reported from various parts of the developing world.¹¹ These MDR strains cause high rate of morbidity and mortality. MDR *S.Typhi* is defined as those strains, which are resistant to all 3 first line drugs recommended for typhoid fever; i.e., chloramphenicol, co trimoxazole and ampicillin.¹² Fortunately, all the isolates, obtained from the patients of typhoid fever in this outbreak, were sensitive to ampicillin, ceftazidime, ciprofloxacin, gentamicin, tetracycline, chloramphenicol and co trimoxazole, except nalidixic acid. In *S. Typhi*, quinolones resistance is usually mediated by mutation in *gyrA* gene or other topoisomerase genes and alteration of fluoroquinolones uptake.¹³ There were several reports on fluoroquinolones resistant isolates of *S.Typhi*.¹⁴ Quinolones (nalidixic acid) resistant *S.Typhi* infection was treated by various workers with third generation cephalosporins.¹⁵ But sporadic incidences of resistance to third generation of cephalosporins were also reported by few others.^{14, 15}

In our study, 5 cases showed significant titre of antibody to O antigen. Sensitivity, specificity and predictive values of Widal test vary from place to place.¹ Commonly Widal test becomes positive after the first week of illness. This test is easy to perform and cheap. But one may get 30% of negative result in culture positive typhoid cases.¹⁶

After the outbreak, thorough inspection of mess, hostel premises and drinking water sources was done by a team of doctors from preventive and social medicine department. The team observed that there was heavy fly nuisance in the kitchen and poor quality of kitchen hygiene. They also noted that proper hand washing was not observed by food handlers and students. No medical checkup for food handlers were in practice. OT test for chlorination of the water supply was done by the team and chlorine was not found in the water. Dosy meter of the school for detection of chlorination was not working at the time of inspection. The team advised monthly checkup of food handlers. They also suggested for improvement of personal hygiene, control of pest and fly, chlorination of drinking water (14 ml/1000 liter) and regular cleaning of water storage tanks. Basic sanitary education was given to the residents of the Sainik School.

The investigation suggested that the probable cause of the outbreak was contamination of water supply. At that time of the year, there was acute water scarcity and requirement of water was met by the school by purchasing water from outside, supplied by tankers. That water was tested and found not consumable. Several other workers also reported typhoid fever outbreak as water borne.^{17,18} Recently, centre for disease control reported multistate outbreak of typhoid fever infections associated with frozen fruit pulp.¹⁹

However, with prompt laboratory diagnosis and remedial action, further spread of the outbreak was controlled.

5. Conclusion

Though, incidence of typhoid fever has decreased considerably with awareness of hygiene practices and improvement of water supply, it still sometimes create health hazard in developing countries. Prompt diagnosis and control measures can avoid complications and spread of the infection.

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