Research Article

Clinical profile and treatment outcome of typhoid fever in children at a teaching hospital, Ahmedabad, Gujarat, India

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Abstract

Background: *Salmonella typhi* is responsible for the occurrence of enteric fever, which is likely a fatal multisystemic disorder. The diagnosis of typhoid fever is challenging because of the diversified clinical manifestations. It is a major public health problem in India. The incidence of enteric fever can be regarded as an index of sanitary measure practiced in our country. However, the diagnosis most often remains either as an unsubstantiated clinical impression or a serological diagnosis and occasionally confirmed by blood culture.

Objective: To evaluate the varied clinical presentations, complications, and prognosis of enteric fever.

Materials and Methods: A prospective study was done at Pediatrics Department of a teaching institute to study the clinical profile and clinical course of enteric fever for a period of 1 year from November 2012 to October 2013. In this prospective study, 98 consecutive serological or culture positive cases of enteric fever were studied. A detailed history, clinical profile, and complications encountered at the time of admission and during the course of stay in the hospital were recorded.

Result: Of the 98 children, 54 (55.10%) were girls and 44 (44.90%) boys, with the male: female ratio of 0.81:1. None of the patients included in the study had taken typhoid vaccine in the past. Leukopenia was seen in 11.2% and leukocytosis in 17.4% patients. Lymphocytosis was observed in 70.4% patients. The most common symptoms were fever (100%), abdominal pain (57.14%), vomiting (50%), anorexia (30.61%), and cough (13.26%). The most common signs observed in patients by the pediatrician were toxic look (92.85%), coated tongue (66.32%), pallor (39.79%), hepatomegaly (36.73%), and splenomegaly (20.40%). The mean duration of hospital stay was 6.4 ± 0.86 days, and there was no mortality in our series. Most of the patients responded to treatment with cephalosporin (91.84%). Complications of typhoid fever were seen in 8.16% of patients. None of the patients included in the study had taken typhoid vaccine in the past.

Conclusion: Endemicity, outside eating, poor sanitation, and poor personal hygiene were the commonest observed causative factors. So, public awareness about safe drinking and feeding practices, proper sanitation, and hygiene is the most useful preventive measure to prevent morbidity from typhoid fever.

KEY WORDS: Clinical profile, treatment outcome, typhoid fever, children

Introduction

Salmonella typhi (*S. typhi*) is a Gram-negative bacterium that causes typhoid, which is a preventable, communicable disease and still a major global threat to public health. In spite of immunization, estimates for the year 2000 suggested that there were over 2.16 million episodes of typhoid occurrences worldwide resulting in 216,000 deaths with more than 90% of morbidity and mortality from Asia.[1] Ochiai et al.,[2] in their review of disease burden owing to typhoid from five Asian countries, reported a higher incidence of typhoid fever from India, Indonesia, and Pakistan. Although the incidence of typhoid has decreased markedly in the developed country, it is still high in the developing countries. Morbidity owing to typhoid ranges from 107 to 229 per 100,000 people in India.[3] Improved standard of public health has resulted in a decline of the incidence, but there is still a chance of improvement. Ingestion of

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food or water contaminated with human feces is the common mode of transmission. Water-borne outbreak owing to poor sanitation and direct fecal–oral spread owing to poor personal hygiene are encountered most often. Until 1948, the gold standard antimicrobial agent for the treatment of typhoid was believed to be chloramphenicol.[4] But, in the last two decades, the resistance of strains of *S. typhi* to chloramphenicol has increased. *S. typhi* resistant to chloramphenicol was first reported from Britain in 1950,[5] and from India, the resistance was reported since 1972.[6] After that, an increasing frequency of antibiotic resistance has been reported from all parts of the world, but more so from the developing countries.[7] This may be owing to the irrational use of antibiotics.

In endemic areas such as India, book picture of signs and symptoms in enteric fever are not often seen. This may be owing to the widespread and indiscriminate use of antimicrobials and antipyretics, which also contributes to the development of some unusual or atypical presentations of enteric fever and antibiotic resistance in our country. Unusual manifestations lead to diagnostic dilemma and delay in diagnosis of the disease. This study was concerned with the evaluation of varied clinical presentations, complications, and prognosis of enteric fever.

Materials and Methods

A prospective study was done at a teaching institute to study the clinical profile and course of enteric fever for a period of 1 year from November 2012 to October 2013. During this period, all the patients who were admitted with clinical diagnosis of enteric fever were investigated for Widal test and blood culture. Ninety-eight children who were positive for either test were enroled in the study. Clinical diagnosis was done by the pediatricians. A detailed history, clinical profile, treatment history, and complications encountered at the time of admission and during the course of stay in hospital were recorded with informed consent from the parents of patients.

The inclusion criteria were as follows:(1) patients aged ≤ 12 years admitted in the pediatric department and (2) positive serum Widal test: titer of >1:120 to both "O" and "H" antigen or positive blood culture for *S. typhi*.

The exclusion criteria were as follows: (1) patients aged > 12 years admitted in the pediatrics department, (2) patients whose parents did not give consent, and (3) patients who left the hospital against medical advice.

Data were entered in Microsoft Excel and analyzed using Epi-Info 7.1.5. Continuous variables were expressed as mean and SD. Categorical variables were expressed as percentages. Appropriate statistical tests were applied accordingly. A *p* value less than 0.05 was considered as significant.

Result

During the study period, 104 children were clinically diagnosed with enteric fever. On laboratory investigation, 98 children were found positive for either Widal test or blood culture or positive for both the tests. So, the clinical profile of 98 indoor patients was observed during the course of hospital stay. Of the 98 children, 54 (55.10%) were girls and 44 (44.90%) boys, with the male:female ratio of 0.81:1. Of the 98 patients included in the study, only two (2.04%) patients revealed a history of typhoid fever. Ninety-six patients were using water from municipal water supply and only two patients using borewell water. Thirty-eight (32.7%) patients showed history of roadside eating. None of the patients included in the study had taken typhoid vaccine in the past [Table 1].

Leukopenia was seen in 11.2% and leukocytosis in 17.4% patients. Lymphocytosis was observed in 70.4% patients. In this study, 48 (49%) patients showed mild anemia, 19 (19.4%) patients moderate anemia, and only two (2%) patients severe anemia [Table 2].

In this study, fever was the chief presenting complaint present in all the patients (100%). The other most common symptoms were abdominal pain (57.14%), vomiting (50%),

Table 1: Basic variable of patients

Variable	Number of patients	Percentage
Age (years)		
<5	31	31.63
>5	67	68.37
Sex		
Female subjects	54	55.10
Male subjects	44	44.90
History of typhoid	2	2.04
History of roadside eating	38	38.78
Water supply source		
Municipality water supply	96	97.96
Borewell	2	2.04

Table 2: Laboratory results in patients

Laboratory test	Number of patients	Percentage
WBC count		
<4,000 mm^3	11	11.2
4,000–11,000 mm^3	70	71.4
>11,000 mm^3	17	17.4
% of lymphocytes in WBC		
>45	69	70.4
<45	29	29.6
Laboratory tests for typhoid		
Blood culture positive	4	4.10
Widal test positive	96	97.96
Both the tests positive	3	3.06
Hb level (g/dL)		
<7	2	2
7–8.9	19	19.4
9–11	48	49
>11	29	29.6

Table 3: Presenting symptoms of patients

Symptoms[a]	All patients (*n* = 98), *n* (%)	Patients aged < 5 years (*n* = 31), *n* (%)	Patients aged > 5 year (*n* = 67), *n* (%)
Fever	98 (100)	31 (100)	67 (100)
Abdominal pain	56 (57.14)	16 (51.61)	40 (59.70)
Vomiting	49 (50)	15 (48.38)	34 (50.74)
Anorexia	30 (30.61)	8 (21.05)	22 (32.83)
Cough	13 (13.26)	5 (13.15)	8 (11.94)
Body ache	4 (4.08)	3 (9.61)	1 (1.49)
Headache	3 (3.06)	0	3 (4.47)
Constipation	2 (2.04)	0	2 (2.98)
Irritability	1 (1.02)	0	1 (1.49)
Aphasia	1 (1.02)	0	1 (1.49)
Convulsion	1 (1.02)	0	1 (1.49)

[a]Multiple symptoms are possible.

Table 4: Signs positive in child patients

Signs	All patients (*n* = 98)	Patients of < 5 year (*n* = 31)	Patients of > 5 year (*n* = 67)	*P*
Toxic look	91 (92.85)	28 (90.32)	63 (94.02)	<0.05
Coated tongue	65 (66.32)	19 (61.29)	46 (68.65)	<0.05
Pallor	39 (39.79)	16 (51.61)	26 (38.80)	<0.05
Hepatomegaly	36 (36.73)	09 (29.03)	27 (40.29)	<0.05
Splenomegaly	20 (20.40)	03 (9.67)	17 (25.37)	<0.05
Abdominal tenderness	0	0	0	NA
Rose spots	0	0	0	NA

Table 5: Frequency of complications in patients

Complications	Number of patients (*n* = 98)	Percentage
Hepatitis	2	2.04
Appendicitis	2	2.04
Colitis	2	2.04
Encephalopathy	1	1.02
Septic shock	1	1.02
Thrombocytopenia	1	1.02
Total	8	8.16

anorexia (30.61%), and cough (13.26%). Other complaints such as body ache (4.08%), headache (3.06%), constipation (2.04%), irritability (1.02%), aphasia (1.02%), and convulsions (1.02%) were present in small number of patients. Fever was the presenting complaints in both the age groups. Gastrointestinal (GI) symptoms such as abdominal pain, vomiting, and anorexia were more commonly observed in patients > 5 years of age [Table 3].

The most common signs observed by the pediatrician in patients were toxic look (92.85%), coated tongue (66.32%), pallor (39.79%), hepatomegaly (36.73%), and splenomegaly (20.40%). None of the patients showed abdominal tenderness or rose spots. Most of the clinical signs were more common in patients > 5 years of age, and this difference is statistically significant ($p < 0.005$, significant). Pallor was more commonly observed in patients (51.61%) < 5 years of age ($p < 0.05$) [Table 4].

All the patients included in the study were started with ceftriaxone. Of all these patients, only eight (8.16%) patients showed clinical resistance to ceftriaxone and given quinolones. Two (2%) patients required azithromycin in addition to quinolones. Fifty-eight (59.1%) patients became afebrile in less than 3 days from the start of the treatment and 28 (28.5%) patients afebrile within 4–7 days. Only 12 (12.4%) patients showed fever for more than 7 days from the start of the treatment. No age-related difference was observed in the time interval to become afebrile. The mean duration of hospital stay was 6.4 ± 0.86 days, and there was no mortality in our series. In this study, 83.67% patients showed less than 7-day stay in hospital, and 11.22% patients required hospitalization for nearly 2 weeks. Only five (5.11%) patients required hospitalization for more than 2 weeks.

Complications of typhoid fever were seen in 8.16% of patients. Appendicitis, colitis, and hepatitis was seen in two each (2.04%). Encephalopathy, septic shock, GI bleed, and infection-associated thrombocytopenia were seen in one each (1.02%) [Table 5].

Discussion

In this study, more patients of enteric fever were in the age group of 6–10 years. This is probably owing to the exposure to unhygienic foods from outside. This finding is comparable with the studies done by Arora et al.,[8] Sen et al.,[9] and Comeau et al.,[10] where the average age of presentation was 7.4, 7.6, and 7.5 years, respectively. However, no age is exempted from typhoid. The youngest patient included in the study was of 1 year. This was probably because this child was being given top milk in dilution with tap water. This supports food-borne transmission of *S. typhi*. In this study, male:female ratio was 0.81:1. In the studies done by Sen et al.,[9] Comeau et al.,[10] and Koul et al.,[11] there was a male predominance.

In this study, organism was isolated from blood in only 4.10% patients. The use of antibiotics in advance and delay in presentation reduced the rate of isolation of organisms from blood culture. The culture is time-consuming and not available in all the places of India. So, Widal test may be regarded as an important diagnostic tool for diagnosing enteric fever in strongly suspected cases in our country. Significant titer was found in the second week and onward in the illness. Pallor was found in 39.79% patients in this study. This finding is similar to the study done by Malik and Malik[12] (35%). In the study done by Patankar and Shah,[13] pallor was found in 88% of the patients. Low incidence in our study may be owing to only involving children, while the study done by Patankar and Shah[13] also involved the female subjects in reproductive age group who showed high anemia prevalence.

In this study, fever was the presenting complaint in all the patients (100%). This is comparable with the studies done by Comeau et al.,[10] Malik and Malik,[12] Patankar and Shah,[13] and Sood and Taneja.[14] GI complaints were the second common presenting symptom in this study. Abdominal pain was present in 57.14% patients and vomiting in 50% patients. This is similar to the study done by Comeau et al.,[10] which observed abdominal pain in 56.4% and vomiting in 48.7% patients. Constipation was observed in only 2.04% patients in our study, while it was not present in any of the patients according to the study done by Patankar and Shah.[13] Constipation was present in 17% patients in the study done by Sood and Taneja,[14] about 12.8% patients in the study by Comeau et al.,[10] and 11.2% patients in the study done by Taneja et al.[15]

In this study, toxic looks (92%) and coated tongue (66.32%) were the most common clinical signs observed. In the study by Sood and Taneja,[14] toxic look was seen in 52% patients. Coated tongue was present in 81.2% patients in the study done by Taneja et al.[15] and 50.2% patients in the study done by Sood and Taneja.[14] Hepatomegaly was found in 36.73% patients in this study. This is similar to the study done by Sood and Taneja,[14] which observed hepatomegaly in 32% patients. Splenomegaly was found in only 20.40% patients in this study. This is comparable with the study done by Comeau et al.[10] (20.5%). Rose spots could not be appreciated in any of the patients in this study. This was comparable with the studies done by Saxena and Sharma,[16] where only 0.5% patient showed rose spots. The study done by Comeau et al.[10] observed rose spots in 2.6% patients. Rose spots were not observed in most of the Indian studies, probably, because of the dark color of the skin of Indian population.

In this study, complications were seen in only 8.1% patients. Life-threatening complications including myocarditis and GI hemorrhage were not seen in this study. Among the rarer complications of enteric fever, we encountered two cases of hepatitis. A brief report of enteric hepatitis has been documented earlier.[17] Typhoid encephalopathy, another interesting complication seen in one of our patients is being reported as a rising trend. Studies by Patankar and Shah[13] (18.8%) and Comeau et al.[10] (38.5%) observed more complications when compared with our study.

Conclusion

Typhoid fever continues to be a major health problem resulting in significant number of children requiring hospitalization. Public health interventions to minimize human carrier contact, safe water supply, improved personal hygienic measures including health-care behavior strategies, typhoid vaccination, and rational antibiotic selection based on sensitivity pattern to prevent resistance will help to reduce the morbidity and mortality of this global health problem.

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