International Journal of Contemporary Pediatrics
Shekar V et al. Int J Contemp Pediatr. 2020 Apr;7(4):901-904
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20201151

Original Research Article

Clinical profile and antibiotic sensitivity pattern of typhoid fever in children: a hospital based prospective study from a tertiary care center

Shekar V., Chapay Soren*, Lakshmi Aparnadevi V. V., Umadevi M., Malathi Vanka

Department of Pediatrics, SVS Medical College and Hospital, Mahabubnagar, Telangana, India

Received: 31 January 2020
Revised: 29 February 2020
Accepted: 05 March 2020

***Correspondence:**
Dr. Chapay Soren,
E-mail: drcsoren55@yahoo.co.in

ABSTRACT

Background: Typhoid fever is a serious public-health problem in many developing countries including India. There is a wide spectrum of clinical presentation and with the emergence of multidrug resistant typhoid now a days, the treatment has become still more complex. The present study authors describe the clinical profile and antibiotic sensitivity pattern of typhoid fever in children from a tertiary care in Mahabubnagar, Telangana, South India.
Methods: This hospital based prospective observational study was done in Department of Pediatrics, SVS Medical College, Mahabubnagar, Telangana over a period of 3-year period from January 2017 to December 2019. The study was approved by institutional ethics committee. Written informed consent was obtained from children's parents. All pediatric patients diagnosed as typhoid fever if presented with fever (temperature >38ºC) for at least 3 days with positive blood culture for *S. typhi* or paratyphi were included in the study. The demographic profile and clinical data were recorded and tests including antibiotic sensitivity and resistance were done.
Results: A total of 136 patients were included in the study. Majority of the children were between 8 to 12-year age group (38.2%). Out of 136 children, 78 were males and 58 were females. Majority of the cases were from rural areas accounting for 69%. Drinking water source was tap water in 63% cases and bore well water in 37% cases. Majority (65%) belonged to lower socioeconomic class and 68% were during rainy seasons. The clinical findings observed were fever (100%), vomiting (98, 72%), diarrhea (55.8%), headache (45.5%), and splenomegaly (42.6%). Other clinical features found were coated tongue, abdominal pain, hepatomegaly, constipation, and dehydration. Six children had complications, 3 had enteric hepatitis, 2 had shock, and 1 had encephalopathy. Ampicillin, amoxicillin and chloramphenicol resistance was observed in 76%, 71% and 22% of patients with typhoid fever respectively. Maximum sensitivity was observed with ceftriaxone (95%), followed by aztreonam (92%), ciprofloxacin (84.5%), and azithromycin (77%).
Conclusions: Clinical presentation in the study subjects was similar to available reports from literature. Increasing resistance of *salmonella* to Ampicillin and amoxicillin were observed.

Keywords: Antibiotic sensitivity, Ceftriaxone, *Salmonella*, Typhoid fever

INTRODUCTION

Typhoid fever, caused by gram negative bacteria *Salmonella* enterica serotype *typhii or paratyphi* A or B., has been estimated to cause approximately 27 million infections each year worldwide.[1] Typhoid fever is a serious public-health problem in many developing countries including India and other Southeast Asian countries, where it is estimated that 80% of the world's typhoid fever cases occur. In India, morbidity from typhoid fever ranges from 107-229 per 1, 00,000 population.[2]

The disease can occur in all age group with highest incidence among children.[3] The disease presents as a clinical dilemma as illness resembles several other infections and because of emergence if drug resistant organisms. Undiagnosed and undertreated cases may result in serious complications. Clinical history, physical examination findings and fever pattern are suggestive but can neither confirm nor exclude typhoid. The definitive diagnosis of typhoid fever requires the isolation of *Salmonella typhi or paratyphi* from the blood, feces, urine or other body fluids. Blood culture is regarded as the gold standard for diagnosis and carry 70-75% diagnostic yield in the first week of illness.[4]

Blood culture also gives information about antibiotic sensitivity of the isolate; however, administration of prior antibiotics is impediments in this diagnostic approach. With indiscriminate use of antibiotics, multidrug resistant strains of *Salmonella typhi and paratyphi* are emerging with changing clinical pattern posing problem in diagnosis.[5] The clinical response of the typhoid fever to the antibiotics differs from one country to another and within the same country in due course of time.[6] There is a scarcity of studies in literature about typhoid fever in children from South India. Hence, this prospective study was carried out to study the clinical profile of children with culture proven typhoid fever and their antibiotic sensitivity pattern.

METHODS

This prospective observational study was carried out in the Department of Pediatrics, Sri Venkata Sai Medical College, Mahabubnagar, Telangana, South India, during 3-year period from January 2017 to December 2019. The study was approved by the Institutional Ethical Committee.

Inclusion criteria

All pediatric patients diagnosed as typhoid fever if presented with fever (temperature >38oC) for at least 3 days with positive blood culture for S. typhi or paratyphi were included in the study.

Exclusion criteria

Patients who were clinically diagnosed as typhoid fever with negative blood culture were excluded from the study.

After obtaining the informed written consent, the patients' details, clinical data, laboratory parameters, and treatment were noted in a predesigned and pre-validated proforma and analyzed. Statistical analysis was done using SPSS version 14. The two-sample test was used to compare continuous variables and the chi square test was used to compare categorical variables. A p value of less than 0.05 was considered significant.

RESULTS

During the study period from January 2017 to December 2019, a total of 288 children with suspected enteric fever were admitted; 136 were culture positive (*S. Typhi* 102, *S. Paratyphi* A34) accounting for 2.2% of the 3799 Pediatric hospital admissions.

Table 1: Age wise distribution of the children with typhoid fever.

Age (yrs.)	Number (n=136)	Percentage (%)
<4	13	9.5
4-8	27	19.8
8-12	52	38.2
12-16	44	32.3

According to age, majority of the patients i.e. 52 (38.2%) patients were in the age group of 8 to 12 years, followed by 44 (32.3%) patients in the age group of 12-16 years, 27 (19.8%) patients in 4-8 years, and 13 (9.5%) patients below 4 years of age (Table 1).

Table 2: Sex wise distribution of the patients.

Sex	Number (n=136)	Percentage (%)
Male	78	57.4
Female	58	42.6

The majority of the patients were males 78 (57.4%) and 58 (42.6%) were females (Table 2). Male to female ratio was observed to be 1.3:1.

A total of 94 (69.1%) patients were from rural area, whereas 42 (31.9%) were from urban area. Drinking water source was tap water in 86 (63.2%) cases and bore well water in 50 (36.8%) cases. According to Modified Kuppuswamy Scale 89 (65.44%) were from lower class, 33 (24.26%) from middle class, and 14 (10.02%) from upper socioeconomic class.

Table 3: Seasonal variation observed among confirmed cases of typhoid Fever.

Season	Number (n=136)	Percentage (%)
Summer	44	32.5
Rainy	76	55.8
Winter	16	11.7

Seasonal variation among enteric fever cases showed that maximum number of patients were observed during rainy seasons (76, 55.8%), followed by summer (44, 32.5%) and winter (16, 11.7%) (Table 3).

The common clinical features of typhoid fever observed were fever (100%), vomiting (98, 72%), diarrhea (76, 55.8%), headache (62, 45.5%), and splenomegaly (58, 42.6%). Other clinical features found were coated tongue, abdominal pain, hepatomegaly, constipation, and

dehydration (Table 4). In this study, 6 children had complications, 3 had enteric hepatitis, 2 had shock, and 1 had encephalopathy.

Table 4: Distribution of the patients as per the clinical feature.

Clinical feature	No. (n=136)	Percentage (%)
Fever	136	100
Vomiting	98	72
Diarrhea	76	55.8
Headache	62	45.5
Splenomegaly	58	42.6
Coated tongue	50	36.7
Abdominal pain	46	33.8
Hepatomegaly	42	30.8
Constipation	22	16.2
Dehydration	18	15.4

Ampicillin, amoxicillin and chloramphenicol resistance was observed in 76%, 71% and 22% of patients with typhoid fever respectively in the present study. Maximum sensitivity was observed with ceftriaxone (95%), followed by aztreonam (92%), ciprofloxacin (84.5%), and azithromycin (77%) (Table 5).

Table 5: Antibiotic sensitivity pattern of culture positive *salmonella*.

Antibiotic	Sensitivity n (%)	Resistance n (%)
Amoxycillin	40 (29)	96 (71)
Chloramphenicol	50 (37)	86 (63)
Ampicillin	32 (24)	104 (76)
Nalidixic acid	95 (70)	41 (30)
Ciprofloxacin	115 (84.5)	21 (15.5)
Ceftriaxone	130 (95)	6 (5)
Azithromycin	104 (77)	32 (23)
Aztreonam	125 (92)	11 (8)

All the patients diagnosed with typhoid fever were treated with ceftriaxone. In those patients who were discharged before 14 days, therapy was completed with cefixime. Azithromycin was added in 13 patients due to poor response after 7 days of initiation of ceftriaxone. Six patients were resistant to ceftriaxone; these children were treated with aztreonam. The mean duration of hospital stay was 7 days for uncomplicated cases and there was no mortality in this series.

DISCUSSION

In the present study, of the 136 children with microbiologically confirmed typhoid fever, majority were between 8 to 12 years age group (38.2%), followed by 12 to 16 years of age group (37.4%). Study by Sanjay et al, reported that 9 to 12 years age group were the most common age of presentation of typhoid fever, whereas 5 to 10 years was found as the most common age of presentation of typhoid fever in study by Ramaswamy et al, and Walia et al.[7-9] The most likely reason for higher rate typhoid fever in this age group may be due to consumption of unhygienic foods or water from outside. Beyond 12 years of age, probably immunity is better which provides better protection against *Salmonella* than younger age group.

Male to female ratio observed in this study was 1.3:1. This finding was comparable with the studies of Siddiqui SS et al, and Hetal N et al.[10,11] This male predominance might be due to greater exposure of boys to contaminated food and water outside the home than girls.

Majority of children with typhoid fever in this study belonged to urban areas (69%), whereas 31% were from rural area. These findings were in consistent with findings by Siddiqui S. et al.[10] Higher rate of typhoid fever in urban area as compared to rural area may be due to use of contaminated municipal tap water for drinking in urban areas as compared to bore well water users in rural areas.

Majority of patients with typhoid fever (65.44%) in this study population belonged to lower socio-economic class. There was a significant association between socioeconomic status and enteric fever ($p<0.001$). Several studies also support the finding that enteric fever was more common in lower socioeconomic group.[12-14] This is possibly as a result of poor sanitation and poor personal hygiene. Seasonal variation of presentation of typhoid fever in children to hospital was observed in this study. Maximum number of patients were observed during rainy seasons (76, 55.8%), followed by summer (44, 32.5%) and winter (16, 11.7%). Pandey K.K et al, reported maximum incidence between May-July and Arora et al, reported 40.6% cases in the period of September-October.[15-16]

All the patients in this study presented with fever as main complaint. Next common clinical features reported were vomiting (98, 72%), diarrhea (76, 55.8%), headache (62, 45.5%), and splenomegaly (58, 42.6%). Other clinical features found were coated tongue, abdominal pain, hepatomegaly, constipation, and dehydration. These observations were consistent with other studies.[11,15,17,18] In this study, 6 children had complications of typhoid fever, 3 had enteric hepatitis, 2 had shock, and 1 had encephalopathy.

Ceftriaxone was the initial antibiotic of choice in all patients in this study. Azithromycin was added in 13 patients due to poor response after 7 days of initiation of ceftriaxone. Six patient's resistance to ceftriaxone, were treated with aztreonam. There was no mortality in this study population.

CONCLUSION

From the present study, authors conclude majority of patients of typhoid fever children were seen in the age

group between 8 to 12 years, with male predominance, from rural background and lower socioeconomic status, and more during the rainy season. The clinical features of typhoid fever are fever, vomiting, diarrhoea, headache, splenomegaly, coated tongue, abdominal pain, hepatomegaly, constipation, and dehydration. Majority of the cases are sensitive to ceftriaxone and aztreonam.

Limitations of the present study were single center study over a shorter duration and small sample size. A multi-center study with large sample size over long duration will give a complete picture on typhoid fever. However, the present study data will add to the literature regarding clinical profile and antibiotic sensitivity pattern of typhoid fever from this geographic area which will guide the clinicians for better treatment of patients.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Buckle GC, Walker CL, Black RE. Typhoid fever and paratyphoid fever: systematic review to estimate global morbidity and mortality for 2010. J Global Health. 2012 Jun;2(1): 010401.
2. Mehta PJ, Hakim A, Kamath S. The changing faces of salmonellosis. J Assoc Phys Ind. 1992 Nov;40(11):713.
3. Paniker CK, Vimala KN. Transferable chloramphenicol resistance in *Salmonella typhi*. Nature. 1972 Sep;239(5367):109-10.
4. Mehta SR, Narula HS, Roy SK. Atypical presentation of enteric fever. MJAFI. 1987;43:58-60.
5. Issit DD and Anstee DJ. Applied blood group Serology. 4th Ad. Montgomem Scientific Public; 1996:218-46.
6. Shrestha SK, Basnet S. Antibiotic sensitivity pattern in culture positive typhoid fever cases isolated at Patan hospital. J Pathol Nepal. 2019 Mar 29;9(1):1450-2.
7. Baviskar SP, Bendale AG. A clinical profile and associated factors with typhoid fever inchildren at tertiary health care center. Med Pulse Intern J Pediatr. May 2017;2(2):12-4.
8. Ganesh R, Janakiraman L, Thiruvengadam V, Sathiyasekeran M. Profile of Typhoid Fever in Children from a Tertiary CareHospital in Chennai-South India. Ind J Pediatr. 2010;77:1089-92.
9. Walia M, Gaind R, Paul P, Mehta R, Aggarwal P, Kalaivani M. Age-related clinical and microbiological characteristics of enteric fever in India. Trans Royal Soci Trop Med Hyg. 2006 Oct 1;100(10):942-8.
10. Siddiqui SS, Koppa SK, Kale AV. Clinical profile of typhoid fever in children at a tertiary care hospital: a cross sectional study. Int J Contemp Pediatr. 2017;4:1951-4.
11. Jeeyani HN, Prajapati BS, Bloch A. Enteric fever in children: clinical profile, sensitivity patterns and response to antimicrobials. GCSMC J Med Sci. 2015;4(1):40-3.
12. Maheshwari V, Kaore NM, Ramnani VK. Clinico-Epidemiological Profile of Confirmed Cases ofEnteric fever in Rural area of central India. Int J Curr Microbiol App Sci. 2015;4(12):541-7.
13. Bhatti S. Enteric fever in adult patients at Akuh, 1998-2001: Epidemiology, Clinical features, lab diagnosis and antibiotic susceptibility patterns. Q Pakistan J of Med SC. 2002 Apr.
14. Parande MA, Patil CG, Rayate MV, Lukde MU. Epidemiological profile of enteric fever cases admitted in SCSMGH, Solapur. Natl J Commun Med. 2011;2(1):91-5.
15. Pandey KK, Srinivasan S, Mahadevan S, Nalini P, Rao RS. Typhoid fever below five years. Ind Pediatr. 1990 Feb;27(2):153-6.
16. Arora R, Gupta A, Joshi N, Kataria V, Lall P, Anand A. Multidrug resistant typhoid fever: study of an outbreak in Calcutta. Cough. 1992 Jan 1;39:37-8.
17. Sood SC, Taneja PN. Typhoid Fever. Clinical Picture and Diagnosis. Ind J Child Health. 1961;10(2):69-76.
18. Walia M, Gaind R, Mehta R, Paul P, Aggarwal P, Kalaivani M. Current perspectives of enteric fever: a hospital-based study from India. Annal Trop Paediatr. 2005 Sep 1;25(3):161-74.

Cite this article as: Shekar V, Soren C, Aparnadevi VVL Umadevi M, Vanka M. Clinical profile and antibiotic sensitivity pattern of typhoid fever in children: a hospital based prospective study from a tertiary care center. Int J Contemp Pediatr 2020;7:901-4.