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ORIGINAL RESEARCH

Spectrum of typhoid fever amongst febrile children visiting Pediatric tertiary care hospital, clinicopathological profile and response to treatment

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ABSTRACT

Background: Typhoid fever, a serious systemic infection caused by the Gram-negative bacterium Salmonella enterica serovar Typhi (S. typhi), has remained a major global health issue for centuries. The present study was conducted to assess spectrum of typhoid fever amongst febrile children. **Materials & Methods:** The study population comprised 150 children admitted to the pediatric ward of, Rama Medical College Hospital and Research Centre, Mandhana, Kanpur, UP. Symptoms, laboratory findings and treatment was recorded in case history. **Results:** The age distribution shows that the highest incidence was among children aged 5 to 9 years, accounting for 73.33% of the total cases. Fever was seen in 150, chills in 32, headache in 37, nausea in 60, vomiting in 50, loss of appetite in 42, cough in 11 and diarrhea in 40 children. Hemoglobin <10g% was seen in 98, TLC < 4000/cumm in 63, TLC 4000-10000/cumm in 87, raised ESR (>20 mm) in 137, positive widal test in 150, hepatomegaly (USG) in 32, splenomegaly (USG) in 50, hepatosplenomegaly (USG) in 40. Among the 150 cases examined, 83% experienced defervescence within 7 days, while the remaining 17% achieved defervescence by the 12th day. Ceftriaxone alone was effective in 57% of the cases, whereas the other 43% required the addition of ciprofloxacin. **Conclusion:** This study highlights the diverse manifestations of typhoid fever in children and emphasizes the need for prompt diagnosis and effective treatment. As antibiotic resistance continues to rise, staying informed about current drug sensitivity patterns is essential for managing typhoid fever. Ongoing initiatives in public health education and vaccination, are vital to lower the incidence of this potentially life-threatening infection in children

Keywords: Children, Salmonella enterica serovar Typhi, Typhoid fever

INTRODUCTION

Typhoid fever, a serious systemic infection caused by the Gram-negative bacterium Salmonella enterica serovar Typhi (S. typhi), has remained a major global health issue for centuries. Alongside typhoid fever, other related illnesses caused by Salmonella Paratyphi A, B, and C contribute to the overall burden of enteric fever.[1] This disease burden is particularly pronounced in pediatric populations and remains endemic in regions with inadequate sanitation infrastructure, notably in various parts of India.

Typhoid fever is mainly transmitted via the fecal-oral route, with contaminated food and water being common sources. Accurate diagnosis depends on blood cultures, which are the gold standard for confirming enteric fever, though their use can be challenging in resource-limited areas.[2] Effective management of typhoid fever is crucial for reducing morbidity and mortality. In endemic areas, home-based management with oral antibiotics like fluoroquinolones or third- generation cephalosporins, along with diligent nursing care, is effective for uncomplicated cases. However, multidrug-resistant typhoid fever poses challenges. Since the 1990s, strains resistant to first-line antibiotics have emerged, making fluoroquinolones the preferred treatment. Yet, strains with reduced susceptibility highlight the importance of ongoing surveillance and careful antimicrobial use.[3]

Besides antimicrobial treatment, vaccination is

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essential for preventing typhoid fever, especially in areas with poor sanitation infrastructure.[4] Vaccines, including Vi capsular polysaccharide and Ty21a live attenuated strains, have demonstrated efficacy in reducing the incidence of typhoid fever when deployed as part of comprehensive immunization programs. However, challenges related to vaccine coverage and access persist, particularly in resource-constrained settings.[5] The present study was conducted to assess spectrum of typhoid fever amongst febrile children.

MATERIALS & METHODS

The study population comprised 150 children admitted to the pediatric ward of, Rama Medical College Hospital and Research Centre, Mandhana, Kanpur, UP. during the specified study period. All children meeting the inclusion criteria—fever lasting for at least 3 days, aged from 3 months to 14 years, and not having received antibiotics prior to admission, who were Widal test positive and blood culture showed growth of Salmonella typhi isolates—were considered for inclusion. All parents gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. All patients were assessed for symptoms and laboratory investigations such as CBC, widal test, chest X-rays and abdominal ultrasound were performed. all patients with suspected or confirmed typhoid fever were initiated on empirical antibiotic therapy. Initially, ceftriaxone was administered intravenously at a dosage of 100 mg/kg/day. The choice of antibiotic was adjusted based on the availability of blood culture and sensitivity results. Patients failing to respond to ceftriaxone, defined as persistent fever for 7 days despite treatment, were switched to ciprofloxacin at a dosage of 20 mg/kg/day. The clinical response to therapy was closely monitored, with particular attention to the time taken for defervescence and resolution of clinical symptoms. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

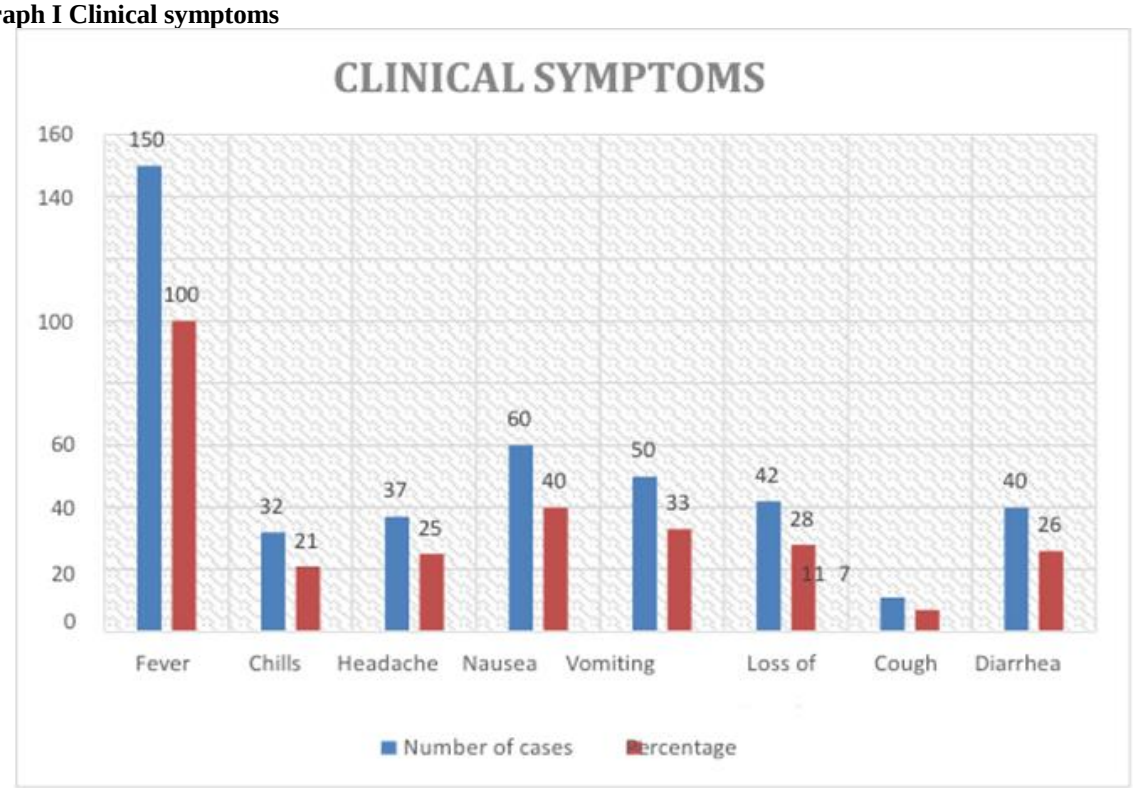
RESULTS

Table I Age Distribution of Patients

Age (Years)	Girls	Boys	Total
1-4	2	7	9
5-9	51	59	110
10-15	18	13	31
Total	71	79	150

The age distribution shows that the highest incidence was among children aged 5 to 9 years, accounting for 73.33% of the total cases.

Graph I Clinical symptoms



Graph I shows that fever was seen in 150, chills in 32, headache in 37, nausea in 60, vomiting in 50, loss of appetite in 42, cough in 11 and diarrhea in 40 children.

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Table III Laboratory Profile

Laboratory Parameter	Number	Percentage
Hemoglobin <10g%	98	65%
Hemoglobin >10g%	52	35%
TLC < 4000/cumm	63	42%
TLC 4000-10000/cumm	87	58%
TLC >10000/cumm	0	0%
Raised ESR (>20 mm)	137	91%
Positive Widal Test	150	100%
Hepatomegaly (USG)	32	21%
Splenomegaly (USG)	50	33%
Hepatosplenomegaly (USG)	40	27%
Normal Urine Microscopy	0	0%
Normal Chest X-ray	0	0%

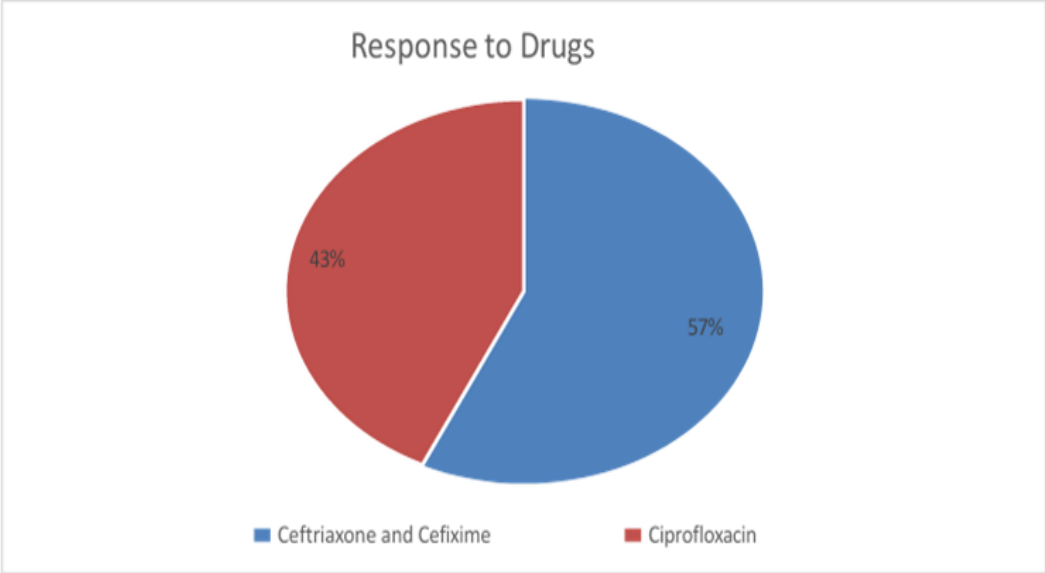
Table III shows that Hemoglobin <10g% was seen in 98, TLC < 4000/cumm in 63, TLC 4000-10000/cumm in 87, raised ESR (>20 mm) in 137, positive widal test in 150, hepatomegaly (USG) in 32, splenomegaly (USG) in 50, hepatosplenomegaly (USG) in 40.

Table IV Response to treatment (Days of Defervescence)

Days of Defervescence	Frequency	Percentage
2	0	0%
3	4	3%
4	10	7%
5	31	21%
6	41	27%
7	37	25%
8	22	15%
9	1	1%
10	4	3%
12	0	0%

Among the 150 cases examined, 83% experienced defervescence within 7 days, while the remaining 17% achieved defervescence by the 12th day.

Graph II Response to treatment



Graph II shows that Ceftriaxone alone was effective in 57% of the cases, whereas the other 43% required the addition of ciprofloxacin.

DISCUSSION

Regular clinical evaluations are essential for monitoring the progress of typhoid fever treatment, detecting complications, and guiding therapeutic interventions.[6] Serial physical examinations allow healthcare providers to assess vital signs, evaluate

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symptoms, and identify any changes in disease severity or progression.[7,8] Close observation of clinical parameters, such as fever pattern, gastrointestinal symptoms, and signs of dehydration or sepsis, facilitates timely intervention and adjustment of treatment regimens based on individual patient responses.[9] The present study was conducted to assess spectrum of typhoid fever amongst febrile children.

We found that the age distribution shows that the highest incidence was among children aged 5 to 9 years, accounting for 73.33% of the total cases. Fever was seen in 150, chills in 32, headache in 37, nausea in 60, vomiting in 50, loss of appetite in 42, cough in 11 and diarrhea in 40 children. The research conducted by Malangori A. Parande and colleagues[10] offered valuable insights into the epidemiological and demographic characteristics of enteric fever, particularly among school-going children. They examined 172 cases, revealing factors contributing to the disease's prevalence in this age group. Key findings included the mobility of school children, their consumption of unhygienic food and water in schools and from roadside vendors as potential risk factors. The study's male-to- female ratio of 1.6:1 indicated a slightly higher incidence among males, possibly due to increased exposure to contaminated environments outside the home.

We found that Hemoglobin <10g% was seen in 98, TLC < 4000/cumm in 63, TLC 4000-10000/cumm in 87, raised ESR (>20 mm) in 137, positive widal test in 150, hepatomegaly (USG) in 32, splenomegaly (USG) in 50, hepatosplenomegaly (USG) in 40. In the study conducted by Asish Kakaria and colleagues[11], chills were reported in 26% of cases, contributing to the spectrum of systemic manifestations associated with typhoid fever. Gastrointestinal symptoms were prevalent, with vomiting reported in 44% of patients and diarrhea in 28%. Abdominal pain, a hallmark feature of enteric infections, was observed in a significant proportion of cases (64%), underscoring the abdominal involvement in typhoid fever pathophysiology. Headache, another common complaint in systemic infections, was noted in 26% of individuals, further highlighting the multi-systemic nature of the disease. Splenomegaly (36%) and hepatomegaly (42%) were frequent clinical findings, indicative of systemic involvement and potential complications associated with typhoid fever.

We found that among the 150 cases examined, 83% experienced defervescence within 7 days, while the remaining 17% achieved defervescence by the 12th day. Ceftriaxone alone was effective in 57% of the cases, whereas the other 43% required the addition of ciprofloxacin. Modi and colleagues[12] investigated the epidemiological and clinical characteristics of enteric fever, aiming to provide insights into the demographics, risk factors, and clinical presentations associated with this infectious disease. Their findings shed light on various aspects of enteric fever, offering valuable information for healthcare professionals and policymakers involved in disease prevention and management. The study revealed that the age group of 6–10 years was the most commonly affected by enteric fever. This demographic trend underscores the vulnerability of children in this age range to the disease, possibly due to factors such as immature immune systems, increased exposure to contaminated environments, and behavioral patterns that may facilitate pathogen transmission.

CONCLUSION

This study highlights the diverse manifestations of typhoid fever in children and emphasizes the need for prompt diagnosis and effective treatment. As antibiotic resistance continues to rise, staying informed about current drug sensitivity patterns is essential for managing typhoid fever. Ongoing initiatives in public health education and vaccination, are vital to lower the incidence of this potentially life-threatening infection in children. Enhancing our understanding and refining clinical strategies can greatly improve typhoid fever management in paediatric cases and lessen its burden on public health.

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