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# PAEDIATRIC ENTERIC FEVER DUE TO *SALMONELLA* PARATYPHI A: A CASE SERIES HIGHLIGHTING CLINICAL FEATURES AND TREATMENT OUTCOMES

Microbiology

**Benedict Vinothini A** MD, DNB, Senior Resident, Dept. of Microbiology, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, 605006, India.

**Nisha S** MD, ESIC Medical College and Hospital, KK Nagar, Chennai, 600078.

**Suprajaa M** MD, ESIC Medical College and Hospital, KK Nagar, Chennai, 600078.

**Ravish Kumar M** MD, ESIC Medical College and Hospital, KK Nagar, Chennai, 600078.

**Sruti Janani R*** MD, ESIC Medical College and Hospital, KK Nagar, Chennai, 600078. *Corresponding Author

## ABSTRACT

Enteric fever caused by *Salmonella* Paratyphi A is increasingly recognized as an important cause of febrile illness among children in endemic regions. This case series describes six pediatric patients who presented with acute febrile illness of 4–7 days duration, commonly associated with abdominal pain, headache, vomiting, or diarrhoea. Hepatomegaly was observed in several cases. Laboratory findings consistently showed leukopenia, marked eosinopenia, and elevated C-reactive protein levels. Blood cultures yielded *S.* Paratyphi A with a short time-to-positivity ranging from 12 to 18 hours. All isolates were sensitive to ceftriaxone and other first-line agents, except nalidixic acid, to which resistance was observed in most cases. All patients responded well to ceftriaxone therapy without complications. This series emphasizes the need for early blood culture confirmation, appropriate antibiotic use, and regular surveillance of antimicrobial resistance to ensure optimal management of paediatric *Salmonella* Paratyphi A infections.

## KEYWORDS

*Salmonella* Paratyphi A, enteric fever, paediatric infection, eosinopenia

## INTRODUCTION

Enteric fever is a systemic disease caused by the serovars of *Salmonella enterica* which includes *Salmonella* Typhi, *Salmonella* Paratyphi A, *Salmonella* Paratyphi B and *Salmonella* Paratyphi C.[1] The incidence of culture confirmed cases of enteric fever in India is approximately 377/100000 population and the case fatality ratio among these is approximately 1%.[2] Paratyphoid fever is less common than typhoid fever and the estimated prevalence of paratyphoid fever in 2017 is 3 million cases globally [1]The true incidence of these infections might be hindered by the widespread use of antibiotics which reduce the isolation rate of these pathogens in culture[3].

There is a decline in enteric fever globally from 25.9 million in 1990 to 14.3 million in 2017[1]. Still in endemic countries like India cases of enteric fever still exist contributing to half of the global burden[4].Fever, abdominal pain, diarrhoea, relative bradycardia, hepatosplenomegaly are the common presentations of enteric fever, but patients may even present with intestinal perforation or CNS manifestations as a complication of enteric fever. Though paratyphoid fever has a less severe course of illness compared to typhoid fever, patients may still develop rhabdomyolysis and multiorgan dysfunction[5].Therefore early identification, vigilant monitoring and early initiation of susceptible antibiotics are essential to reduce the complications and morbidity associated with the disease[6].

Here we present a case series of acute febrile illness in paediatric population due to *Salmonella* Paratyphi A confirmed with blood culture.

**Case 1:**

A 14-year female child who was a known case of seizure disorder with hypoxic ischaemic encephalopathy sequalae and intellectual disability for a decade, presented with fever for a week, associated with chills and rigor. The child also had 3 episodes of vomiting and 2 episodes of loose stools. On examination the temperature was 103.2ºF with a pulse rate of 120/min. Per abdomen was soft on palpation. CRP was elevated (37.5 mg/) and total count was reduced to 3800cells/µL with marked eosinopenia of 0.2% in differential count. Empirical antibiotic therapy with intravenous ceftriaxone (100 mg/kg/day) was initiated after collecting a paired blood sample for culture. The blood sample flagged positive in 24 hours of incubating in BacT Alert automated blood culture system, and the subculture yielded *Salmonella* Paratyphi A which was confirmed by serotyping. The isolate was susceptible to all tested antimicrobials except nalidixic acid. The patient recovered with 5days intravenous ceftriaxone.

**Case 2:**

A 9-year-old female presented with fever and cough for 4 days. On examination the temperature was 102.3$^{0}$C with a pulse rate of 90 beats/minute suggestive of relative bradycardia. Hepatosplenomegaly was felt on palpation. Laboratory investigations revealed a high CRP of 35.98mg/dl, leukopenia of 3990 cells/ µL eosinophils (0.1%) in differential count and normal liver and renal function tests. The patient was started on intravenous Ceftriaxone 100mg/kg/day empirically. Blood culture flagged positive with a time to positivity (TTP) of 18 hours which yielded *Salmonella* Paratyphi A on subculture. The isolate tested sensitive for all the tested antimicrobials except nalidixic acid and imipenem. Fever spikes settled after the initiation of ceftriaxone and the child was discharged after 7 days of treatment.

**Case 3**

A 11-year male child presented with intermittent fever for a week associated with chills and headache. On examination the temperature was 102°F with a pulse rate of 98/minute. Mild hepatomegaly was noted along with anaemia and coated tongue. Leukopenia was observed with eosinopenia (0%) in differential count. CRP level was elevated to 115 mg/L, and the liver function tests were also abnormal with increased alanine amino transferase and aspartate amino transferase. Viral markers for acute febrile illness were negative. Blood culture yielded *Salmonella* Partatyphi A which was resistant to nalidixic acid and ciprofloxacin. The patient recovered clinically with a week of intravenous ceftriaxone therapy, and he was discharged with cefixime 200mh BD for 7 days.

**Case 4**

A 6-year-old male child presented with fever for a week with associated chills. The temperature was recorded to be 100.7°F which subsequently raised to 103°F over 3 days with typical step ladder pattern. The pulse rate was 93/min. The total count was normal, but the eosinophils were low in differential count (0.3%). CRP was elevated to 42 mg/L. Mesenteric lymphadenitis was noted in ultrasonogram of abdomen. Blood sample was sent for culture and sensitivity, and ceftriaxone was started empirically. *Salmonella* Paratyphi A was isolated with a TTP of 12.5 hours which was sensitive to all tested drugs except nalidixic acid. The patient responded clinically to ceftriaxone parenteral therapy.

**Case 5:**

A 7-year male presented with fever and headache for a week, with loose stools on day 1 of fever. The temperature was 103°F with a pulse rate of 107/minute. Hepatomegaly was seen on per abdomen

examination. The total count was within normal limit, but the eosinophil levels were low (0.4%). CRP was elevated to 11 mg/L. All other febrile illness panel tests were negative and liver function tests were normal. The blood culture flagged positive after 15 hours, yielding *Salmonella* Paratyphi A, which was sensitive to all tested antimicrobials except nalidixic acid. The patient showed a good clinical response to one week of parenteral ceftriaxone therapy and was discharged with oral cefixime for a week.

**Case 6:**
A 11-year female presented with fever, abdominal pain and constipation for a week. On examination she was afebrile and hepatosplenomegaly was noted. Laboratory investigations revealed a normal total leukocyte count and an elevated CRP level of 19mg/L with normal liver function tests. *Salmonella* Paratyphi A was isolated from blood culture with a TTP of 18 hours. The isolate was susceptible to all tested antimicrobials except nalidixic acid. The patient improved on treatment with ceftriaxone.

## DISCUSSION:

The six pediatric cases of *Salmonella* Paratyphi A described here share several clinical and laboratory features that are consistent with published case series from endemic settings, while also illustrating ongoing microbiological trends of importance for treatment and stewardship.

Clinically, all patients presented with an acute febrile illness of about one week's duration with associated symptoms such as headache, abdominal pain, vomiting or diarrhea, and in several cases hepatomegaly or hepatosplenomegaly. These features mirror other pediatric cohorts in India and nearby regions in which fever, abdominal pain, hepatomegaly, and coated tongue are commonly reported findings [7,8]. The presence of complications was uncommon in our series and all patients improved with appropriate therapy, which is concordant with many recent hospital-based reports where most uncomplicated paratyphoid infections recover with timely antibiotic therapy [9].

Haematological and inflammatory markers were also similar across cases and to the literature. Leukopenia and low/absent eosinophil counts were common in our series. Absolute eosinopenia has been described repeatedly as a helpful laboratory clue in enteric fever and is reported to occur frequently in culture-proven cases, supporting its value as an adjunctive diagnostic marker in endemic settings [10,11]. Absolute eosinophil count testing may not be done as a routine in resource limited settings, therefore eosinophil percentage less than one in differential count may be taken as a predictor for enteric fever as it a consistent finding. Elevated liver enzymes of two to three times the upper limit is a constant finding as in our reports, but it is not pathognomic and cannot be used as a marker for enteric fever detection [12]. CRP was variably elevated reflecting the inflammatory response to infection.

Microbiological features demonstrated rapid blood-culture positivity in a range of 12 to 18 hours. Short TTPs have been reported in bloodstream infection studies and often correlate with higher bacterial load. In enteric fever, early blood-culture TTPs less than a day is not unusual and support the utility of prompt automated culture systems for early detection [13].

Antimicrobial susceptibility patterns in this case series show a consistent result of preserved susceptibility to third-generation cephalosporins (ceftriaxone) and to other first-line agents, but very frequent resistance to nalidixic acid and occasional decreased susceptibility or resistance to fluoroquinolones (ciprofloxacin). One isolate in our series was resistant to both nalidixic acid and ciprofloxacin. This phenotypic pattern of high nalidixic acid resistance with retained ceftriaxone susceptibility has been documented in multiple Indian studies and surveillance networks, and it supports current empirical treatment choice of ceftriaxone in many hospitals [14,15]. However, recent reports have also documented emergent ceftriaxone-resistant *Salmonella* strains, underscoring the need for continuous local surveillance and cautious antibiotic stewardship [16,17]

In summary, our six cases show a pattern similar to what has been reported for *Salmonella* Paratyphi A infections in children like typical febrile presentations, frequent eosinopenia, CRP elevations, short blood-culture TTPs, and a susceptibility pattern dominated by nalidixic acid resistance with preserved ceftriaxone activity .The favourable clinical outcomes after ceftriaxone treatment in our series are reassuring, but the evolving resistance reported in the literature argues for routine culture and susceptibility testing, judicious empirical therapy guided by local antibiograms, and strengthened surveillance to detect any emergence of cephalosporin-resistant strains early.

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## REFERENCES


1. Stanaway, J. D., Reiner, R. C., Blacker, B. F., Goldberg, E. M., Khalil, I. A., Troeger, C. E., & Hay, S. I. (2019). The global burden of typhoid and paratyphoid fevers: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet Infectious Diseases*, *19*(4), 369-381.
2. Veeraraghavan, B., Pragasam, A. K., Ray, P., Kapil, A., Nagaraj, S., Perumal, S. P. B., & Kang, G. (2021). Evaluation of antimicrobial susceptibility profile in Salmonella typhi and Salmonella paratyphi A: presenting the current scenario in India and strategy for future management. *The Journal of Infectious Diseases*, *224*(Supplement_5), S502-S516.
3. Antillon, M., Saad, N. J., Baker, S., Pollard, A. J., & Pitzer, V. E. (2018). The relationship between blood sample volume and diagnostic sensitivity of blood culture for typhoid and paratyphoid fever: a systematic review and meta-analysis. *The Journal of infectious diseases*, *218*(suppl_4), S255-S267.
4. Kumar, S., Ghosh, R. S., Iyer, H., Ray, A., Vannice, K., MacLennan, C., & Steele, D. (2021). Typhoid in India: An age-old problem with an existing solution. *The Journal of Infectious Diseases*, *224*(Supplement_5), S469-S474.
5. Kumar, M., & Sunder, A. (2022). Salmonella Paratyphi and multiorgan dysfunction: A rare case report. *Journal of Family Medicine and Primary Care*, *11*(10), 6545-6548.
6. Iqbal, N., Basheer, A., Mookkappan, S., Ramdas, A., Varghese, R. G. B., Padhi, S., & Kanungo, R. (2015). Clinicopathological profile of Salmonella typhi and Paratyphi infections presenting as fever of unknown origin in a tropical country. *Mediterranean Journal of Hematology and Infectious Diseases*, *7*(1), e2015021.
7. Suman Kanungo, S. K., Shanta Dutta, S. D., & Dipika Sur, D. S. (2008). Epidemiology of typhoid and paratyphoid fever in India.
8. Chitkara, A. J., Chitkara, S., Narang, P. S., Sundharam, M., & Goyal, M. (2019). Clinico-bacteriological profile of typhoid fever in a private sector hospital in New Delhi. *Indian Pediatrics*, *56*(12), 1033-1036.
9. **Mukhopadhyay, B., Sur, D., Ali, M., et al. (2020).** Clinical profile and antimicrobial susceptibility of *Salmonella Paratyphi A* infections in India. *International Journal of Infectious Diseases, 96*, 108–113.
10. Panigrahi, G., Jagatdeo, K., Mondal, S., Malik, M., Kumar, M. H., Pattnaik, D,& Malick, M. (2025). Evaluating the diagnostic value of absolute eosinopenia in culture-positive enteric fever: a retrospective case-control study. *Cureus*, *17*(7).
11. Ishaq, U., Malik, J., Asif, M., Zaib, H., Haider, I., Zahid, T., ... & Ikram, U. (2020). Eosinopenia in patients with typhoid fever: a case-control study. *Cureus*, *12*(9).
12. Parry, C. M., Hien, T. T., GORDON DOUGAN, P. H. D., White, N. J., & Farrar, J. J. (2002). Medical Progress. *N Engl J Med*, *347*(22).
13. **Sharma, P., Dahiya, S., Manral, N., et al. (2021).** Rapid detection and antimicrobial susceptibility patterns of *Salmonella enterica* serovars in blood culture using BacT/ALERT. *Indian Journal of Medical Research, 154*(1), 97–104.
14. **Singhal, L., Gautam, V., & Ray, P. (2019).** Fluoroquinolone resistance in *Salmonella* Paratyphi A: Current perspectives. *Indian Journal of Medical Microbiology, 37*(2), 187–192.
15. Sahai, N., John Jacob, J., Kumar Arunachalam, D., Kumar Das, B., Kapil, A., Pandey, S., ... & John, J. (2025). Antimicrobial susceptibility trends of S. Typhi and S. Paratyphi in a post-COVID-19 pandemic India, from a multicenter surveillance network. *Scientific Reports*, *15*(1), 13777.
16. Irfan, S., Hasan, Z., Qamar, F., Ghanchi, N., Ashraf, J., Kanji, A., ... & Hasan, R. (2023). Ceftriaxone resistant Salmonella enterica serovar Paratyphi A identified in a case of enteric fever: first case report from Pakistan. *BMC infectious diseases*, *23*(1), 267.
17. **Hooda, Y., et al. (2024).** Emergence of extended-spectrum β-lactamase-producing *Salmonella* Paratyphi A in South Asia: Implications for treatment policy. *Journal of Antimicrobial Chemotherapy, 79*(3), 515–523.