https://doi.org/10.29309/TPMJ/2026.33.09.9887 www.theprofesional.com

ORIGINAL ARTICLE

Empirical antibiotics therapy used for typhoid fever in pediatrics presenting in a tertiary care hospital.

Zara Shafqat[1], Abid Rafiq Chaudhry[2], Rashid Ayub[3]

ABSTRACT… Objective: To determine the frequency and efficacy of empirical antibiotic therapy used for treatment of pediatric typhoid fever in a tertiary care hospital. **Study Design:** Cross-sectional study. **Setting:** Department of Pediatric Medicine, Fatima Memorial Hospital Lahore. **Period:** 12 September 2025 to 12 March 2026. **Methods:** A total of 140 children aged 1-15 years, diagnosed with typhoid fever confirmed by blood culture, were included. Data on demographics, clinical features, and empirical antibiotic prescriptions were collected. Antibiotic sensitivity was assessed for the prescribed empirical antibiotics. **Results:** The study included 140 children with a mean age of 8.0 years; 51.4% were male. The most commonly prescribed empirical antibiotic was ceftriaxone (52.9%), followed by cefixime and ciprofloxacin (19.3%). Imipenem and azithromycin were prescribed to 4.3% of patients. Sensitivity rates were 70% for ciprofloxacin, 28% for ceftriaxone, 62% for cefixime, 50% for azithromycin, and 100% for imipenem. Only 43% of patients were sensitive to the empiric antibiotic prescribed. **Conclusion:** The study highlights dependence on ceftriaxone in the treatment of treating pediatric typhoid fever, despite moderate sensitivity rates. The findings demonstrate that there is a need for antibiotic stewardship program that guide appropriate empirical therapy and can also counter the increase of antibiotic resistance in pediatric populations.

Key words: Antibiotic Resistance, Ceftriaxone, Empirical Antibiotic Therapy, Pediatric Population, Typhoid Fever.

Article Citation: Shafqat Z, Chaudhry AR, Ayub R. Empirical antibiotics therapy used for typhoid fever in pediatrics presenting in a tertiary care hospital. Professional Med J 2026; 33(09):1798-1801. https://doi.org/10.29309/TPMJ/2026.33.09.9887

INTRODUCTION

Typhoid (enteric) fever is a systemic infection caused by the bacterium Salmonella Typhi and Paratyphi. It is an important public health problem in developing countries. The WHO estimates that 11 and 21 million cases and 128,000 to 161,000 typhoid-related deaths occur annually worldwide.[1,2]

The growing problem of drug-resistant Salmonella strains and the outbreak of ceftriaxone-resistant Salmonella typhi in Hyderabad during 2016-2017 is concerning.[3]

It is a serious health threat in Asia and affected children have to face dire consequences if left untreated. The main challenge, however, is accurate diagnosis and the appropriate antimicrobial therapy. Even though ceftriaxone is the drug of choice when it comes to hospitalized patients, concerns are emerging about the development of cephalosporin resistance in adults, though not reported in children yet.[4]

The problem of managing enteric fever is made more difficult and complicated by increasing antimicrobial resistance to the first-line antibiotics used for enteric fever. Multidrug-resistant strains were prevalent worldwide and had previously caused outbreaks in Asian populations. However, the major challenge in treating patients with typhoid fever is antimicrobial resistance, which leaves very few empirical choices to treat such patients.[5]

One of the major contributors of growing antimicrobial resistance, particularly in low and middle-income countries, is the irrational prescription of antibiotics. This is why it is of paramount importance to implement antibiotic stewardship programs that rationalize the use of antibiotics. However, data on antibiotic prescriptions in pediatric outpatient departments could be more extensive.[6] Rauniyar et al.., conducted a cross-sectional study and found that Azithromycin (38.03%) was the most common antibiotic received before presenting to the hospital, with ceftriaxone 151 (100%) being prescribed to all

1. MBBS, FCPS-I, PGR Trainee Paeds Medicine, Fatima Memorial Hospital, Lahore.
2. MBBS, FCPS, MCPS, Fellowship Pediatric Critical Care, MRCPCH, FRCPCH, Associate Professor Pediatric Medicine, Fatima Memorial Hospital, Lahore.
3. MBBS, FCPS (Paeds), PGPN (Boston, USA), IPPN (Australia), Head Pediatric Medicine, Fatima Memorial Hospital, Lahore.

Correspondence Address:
Dr. Zara Shafqat
Department of Paeds Medicine, Fatima Memorial Hospital,
shafqatzara0@gmail.com

Article received on:
03/06/2025
Date of revision:
04/05/2026
Accepted for publication:
05/05/2026

patients after admission, followed by paracetamol (84.1%), azithromycin (43.05%), chloroquine (71.79%), clindamycin (4.64%), amikacin (1.99%) and metronidazole (2.65%).[7]

The objective of this is to determine the frequency of the most common empirical antibiotics therapy used for typhoid fever in pediatrics presenting in a tertiary care hospital. Multidrug-resistance is a common problem faced by pediatricians and medical specialists when faced with cases of typhoid fever. A major reason behind this resistance is prescription of empirical antibiotics as opposed to prescribing antibiotics on the basis of culture sensitivity. Thus, the aim of this study was to assess and analyse the pattern of prescribing empirical antibiotics prevailing among pediatricians of a tertiary care hospital for typhoid fever. The results can help improve medical practices and knowledge. Consequently, in the future, surveillance and workshops can be implemented to improve the practice of prescribing antibiotics more carefully in such cases to prevent multi-drug resistance and its resulting consequences.

METHODS

A cross-sectional study was conducted at the Department of Pediatrics, Fatima Memorial Hospital, Lahore, over six months from 12 September 2025 to 12 March 2026 after approval from ethical committee (FMH-25/09/2023-IRB-1316). The sample size of 140 cases was calculated using the WHO sample size calculator, considering a 95% confidence level, 3.5% margin of error, and an empirical antibiotic usage rate of 38.03% for azithromycin in children with typhoid fever.

The method of selecting participants was non-probability, consecutive sampling, of children aged 1-15 years, of both genders, who had been diagnosed with typhoid fever on the parameter of the presence of fever >100°F for >3 days and further confirmed through blood culture showing Salmonella Typhi or Paratyphi. The sample did not include children with other diagnoses of fever, type I diabetes, chronic renal failure, or chronic liver failure were excluded. Informed consent and ethical approval was obtained from parents before the children were enrolled from pediatric wards. Demographic data, including name, age, gender, weight, duration and grade of fever, residence, socioeconomic status, and admission details, were recorded. Additionally, blood samples were collected to analyze them for blood culture and antibiotic sensitivity. The empirical antibiotic prescribed to each child was documented, and appropriate antibiotics were prescribed based on the lab reports. All the data was recorded in a standardized proforma. Data analysis was performed using SPSS version 25. The Shapiro-Wilk test was used to asses normality with quantitative variables expressed as mean ± standard deviation and qualitative variables as frequency and percentage. The data was also stratified for demographic and clinical factors, and the Chi-square test was applied to compare the empirical antibiotic prescriptions across stratified groups, with a p-value ≤ 0.05 being considered significant.

RESULTS

The study included a total of 140 children diagnosed with enteric fever. The average age of the children was 8.0 years. Of these, 51.4% were male and 48.6 % were female. The prevalence of various symptoms among the children revealed that 15% experienced a duration of fever less than 3 days, while 85% had a duration of fever more than 3 days. Additionally, 75% of the children had loose motions, 78.6% had vomiting, and 30.7% reported anorexia. Symptoms of abdominal pain were present in 17.9% of the children, pallor in 25%, and a coated tongue in 10.7%. Furthermore, hepatomegaly was observed in 5.7% of the children, and splenomegaly in 7.1%.

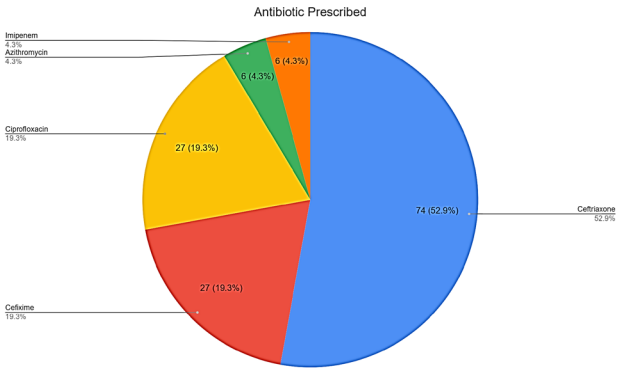
Hematological analysis showed that 13.6% of the children had hemoglobin levels less than 6 g/dL, while 81.4% had more than 6 g/dL. The average neutrophil count was 7545.2 cells/mm^3, and the average lymphocyte count was 10262 cells/mm^3. Additionally, 17.9% of the children had platelet counts less than 150,000/mm^3, whereas 77.1 % had more than 150,000/mm^3. Most patients were prescribed ceftriaxone which made up 52.9% of the patient population, the second most prescribed antibiotics were cefixime and ciprofloxacin (19.3%). 4.3% of patients were given imipenem and azithromycin.

Regarding antibiotic sensitivity, 43% of the patients were found to be sensitive to the empiric antibiotic prescribed. Out of all, the sensitivity for ciprofloxacin

was 70%, 28% for ceftriaxone, 62% for cefixime, 50% for azithromycin and 100% for imipenem.

FIGURE-1

Antibiotic prescribed to the patients



DISCUSSION

In order to treat typhoid fever in children, several empirical antibiotics are used with each having varying patterns of sensitivity. The most commonly used antibiotic as a first-line treatment in both outpatient and hospitalized setting was Ceftriaxone, showing high sensitivity rates, though about 10% of cases experience clinical non-response. Ceftriaxone remains a reliable choice as its resistance rate remains relatively low.[5] In out outpatient departments where intravenous administration is not necessary, Cefixime is often prescribed as the antibiotic of choice.[5] While increasing resistance against Cefixime has been reported in some region, generally it exhibits high sensitivity. This was seen in the study by Roy et al.[8] Additionally, Azithromycin is used as an alternative particularly in those cases where resistance to first-line antibiotics was reported, with high sensitivity in many regions, especially against multi-drug resistant (MDR) strains, though some resistance is reported.[9,10] Ofloxacin is effective for MDR typhoid fever and is often used when other treatments fail, initially showing high sensitivity, but with growing concerns over increasing resistance.[11] Chloramphenicol, historically a first-line treatment, is now used less frequently due to resistance issues, though sensitivity has improved in some areas due to reduced use.[12] Amoxicillin and ampicillin, once common treatments, are now often replaced by more effective antibiotics due to their lower sensitivity and significant resistance rates. A study was done in Lahore by Baig et al.[13] reported alarming levels of antibiotic resistance among children with enteric fever. The study by aimed to determine antibiotic resistance patterns and assess the frequency of multidrug-resistant (MDR) and extensively drug-resistant (XDR) strains of Salmonella Typhi and Salmonella Paratyphi. Conducted from July 2020 to January 2021 at Sharif Medical City Hospital, the study involved 105 children aged 0-15 years, with a mean age of 8.48 years. Our sample size was larger with 140 children and the mean age was about 8 years, similar to their study. Blood cultures revealed 90.5% of isolates were S. Typhi and 9.5% were S. Paratyphi A. We did not have this variable in our study. The study found high resistance rates to ampicillin (86.7%), with all isolates sensitive to imipenem and meropenem. Notably, 21.9% of isolates were MDR, and 56.8% were XDR, while azithromycin, meropenem, and imipenem showed the lowest resistance levels. These findings underscore the significant public health challenge posed by antibiotic-resistant strains and the urgent need for tailored antibiotic stewardship, improved sanitation, vaccination, and rational antibiotic use to combat the spread of resistance.

CONCLUSION

The study provides critical insights on empirical antibiotic practices in a tertiary care setting for the treatment of pediatric typhoid fever. Despite the fact that its efficacy is compromised by moderate sensitivity rates, Ceftriaxone remains the most frequently prescribed antibiotic. The high sensitivity observed for imipenem suggests it as a potential alternative for resistant cases. The findings highlight how crucial it is to conduct targeted antibiotic stewardship programs on an urgent basis to ensure the rational use of antibiotics and reduce the spread of multidrug-resistant strains.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

1. Date K, Shimpi R, Luby S, N R, Haldar P, Katkar A, et al. **Decision making and implementation of the first public sector introduction of typhoid conjugate vaccine—Navi Mumbai, India, 2018.** Clinical Infectious Diseases. 2020; 71(Supplement_2):S172-S8.
2. Frost I, Balachandran A, Paulin-Deschenaux S, Sati H, Hasso-Agopsowicz M. **The approach of World Health Organization to articulate the role and assure impact of vaccines against antimicrobial resistance. Human Vaccines & Immunotherapeutics.** 2022; 18(6):2145069.
3. Umair M, Siddiqui SA. **Antibiotic susceptibility patterns of salmonella Typhi and Salmonella Paratyphi in a Tertiary Care Hospital in Islamabad.** Cureus. 2020; 12(9):e10228.
4. Lhadon T, Basnet S, Gami FC. **Defervescence of enteric fever in children treated with ceftriaxone: A hospital-based study in Nepal.** Research Square. 2021; In press.
5. Dahiya S, Malik R, Sharma P, Sashi A, Lodha R, Kabra SK, et al. **Current antibiotic use in the treatment of enteric fever in children.** The Indian Journal of Medical Research. 2019; 149(2):263-9.
6. Asmaa Y, Kakalia S, Irtza M, Malik R, Jamshaid M, Farrukh H. **Antibiotic use for febrile children in a tertiary care hospital's outpatient department: A cross-sectional study.** Cureus. 2023; 15(6):e40356.
7. Rauniyar GP, Bhattacharya S, Chapagain K, Shah GS, Khanal B. **Typhoid fever among admitted pediatric patients in a Tertiary Care Center: A descriptive cross-sectional study.** JNMA; Journal of the Nepal Medical Association. 2021; 59(241):871-4.
8. Roy M, Bathia J, Ranjit P, Halder PP, Ganguly Dey N, Poddar S. **Culture positivity and antibiotic sensitivity pattern of typhoid fever in children aged 1 to 10 years: A 10-year retrospective study from a tertiary care centre of Eastern India.** Sri Lanka Journal of Child Health. 2023; 52(2):169-74.
9. Carey ME, McCann NS, Gibani MM. **Typhoid fever control in the 21st century: Where are we now?** Curr Opin Infect Dis. 2022 Oct 1; 35(5):424-30.
10. Parry CM, Qamar FN, Rijal S, McCann N, Baker S, Basnyat B. **What should we be recommending for the treatment of enteric fever? Open Forum Infect Dis.** 2023 Jun 2; 10(Suppl 1):S26-S31.
11. Effa EE, Lassi ZS, Critchley JA, Garner P, Sinclair D, Olliaro PL, et al. **Fluoroquinolones for treating typhoid and paratyphoid fever (enteric fever).** Cochrane Database Syst Rev. 2011 Oct 5; 2011(10):CD004530.
12. Siddiqui H, Jahan F, Siddiqui MA. **Pattern of anti-microbial drug resistance in childhood typhoid fever in a selected Hospital in Karachi, Pakistan.** Asian J. Res. Infect. Dis. 2019 Mar. 12 [cited 2024 Jul. 29]; 2(1):1-9.
13. Baig U, Mehdi SM, Iftikhar N. **A pattern of antibiotic drug resistance of Salmonella Typhi and Salmonella Paratyphi among children with enteric fever in a tertiary care hospital in Lahore, Pakistan.** Croat Med J. 2023 Aug 31; 64(4):256-264.

AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Zara Shafqat:** Study design, data collection, analysis, discussion, writing.
2	**Abid Rafiq Chaudhry:** Study concept, topic selection, data interpretation.
3	**Rashid Ayub:** Writing.