Original Article

Antibiotics Sensitivity Patterns of Enteric Fever in a Tertiary Care Hospital

Abdul Khaliq, Syed Kalim ur Rehman, Syed Mohsin Ali Shah, Imran, Muhammad Kashif Afridi and Sabir Khan

ABSTRACT

Objective: To determine frequent organisms causing enteric fever, measure the frequency of antibiotic resistance among isolates of Salmonella Typhi and Salmonella Paratyphi, and analyze the antibiotic sensitivity patterns of enteric fever patients in a tertiary care hospital.

Study Design: A retrospective analysis study.

Place and Duration of Study: This study was conducted at the department of Pediatrics Khyber teaching hospital Peshawar from December 2022 to December 2023.

Methods: Examine blood culture data collected. Patients with enteric fever, aged 1 to 12 years, who have positive blood cultures for Salmonella Typhi or Paratyphi are eligible. Recognized protocols do testing for antibiotic susceptibility.

Results: Three hundred individuals with an enteric fever diagnosis were included in the research. Patients ranged in age from 1 to 12 years, with a mean age of 28±5.3 years. Of these, n-195 (65%) had Salmonella Typhi isolated from it, while n-105 (35%) had Salmonella Paratyphi. According to tests for antibiotic sensitivity, n-255 (85%) of the isolates of Salmonella Typhi and n-210 (70%) of the isolates of Salmonella Paratyphi were resistant to fluoroquinolones. Furthermore, n-180, or 60%, of the isolates of Salmonella Typhi showed signs of resistance to third-generation cephalosporins. These results point to a worrying pattern of antibiotic resistance in the microorganisms responsible for enteric fever within the population under study.

Conclusion: The study discovered concerningly high levels of antibiotic resistance among the isolates of Salmonella Typhi and Salmonella Paratyphi isolated in enteric fever patients at the tertiary care hospital. Since a significant part of isolates are resistant to fluoroquinolones and third-generation cephalosporins, there is an urgent need for comprehensive antimicrobial stewardship and monitoring systems to avoid the emergence of multidrug-resistant strains and to advise appropriate antibiotic administration.

Key Words: Enteric fever, Antibiotic sensitivity, Antimicrobial resistance.

Citation of article: Khaliq A. Kalim ur Rehman S, Shah SMA, Imran, Afridi MK, Khan S. Antibiotics Sensitivity Patterns of Enteric Fever in a Tertiary Care Hospital. Med Forum 2024;35(3):43-46. doi:10.60110/medforum.350310.

INTRODUCTION

Salmonella enterica serovar Typhi and Salmonella enterica serovar Paratyphi are the principal causes of enteric fever, which is still a significant worldwide health risk, especially in poor sanitation facilities[1]. Numerous epidemiological studies have demonstrated the considerable burden of these illnesses, with estimates pointing to millions of cases and thousands of deaths every year[2].

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Received: January, 2024
Accepted: February, 2024
Printed: March, 2024

Effective treatment is severely hampered by antimicrobial resistance (AMR), even with attempts to stop the spread of these diseases. Treatment options have become more complex due to the introduction of Salmonella Typhi strains that are extensively drug-resistant (XDR), meaning they can withstand popular medicines such as fluoroquinolones and third-generation cephalosporins[3]. Not only have endemic locations seen this phenomenon, but areas where the illness was formerly less common have also seen it[4]. Research looking at the antimicrobial susceptibility patterns of Salmonella Typhi and Paratyphi isolates in tertiary care settings sheds essential light on the state of AMR today. For example, in a tertiary care hospital environment, Khan et al. found that Salmonella Typhi isolates significantly resisted several antibiotics, underscoring the critical need for surveillance and stewardship initiatives[5]. The seriousness of the problem was further highlighted by Rahman et al.'s documentation of the development of multidrug-resistant bacteria with concerning resistance profiles[6]. These results highlight the urgent need for thorough monitoring systems and prudent antimicrobial usage

guidelines to slow the emergence of antimicrobial resistance (AMR). Treatment plans and public health initiatives meant to stop the spread of these diseases must be informed by an understanding of the antibiotic sensitivity patterns of enteric fever bacteria in tertiary care institutions[7].

METHODS

Blood culture data from children hospitalized in the pediatrics department of Khyber Teaching Hospital in Peshawar between January 2023 and January 2024 were retrospectively analyzed as part of this study. A total of 300 patients, whose ages ranged from 1 to 12 years, were diagnosed with enteric fever; their mean age was 28±5.3 years. In 65% (n=195) of the patients, blood cultures revealed Salmonella Typhi, and in 35% (n=105) of the cases, Salmonella Paratyphi. Fluoroquinolone resistance was found in 85% (n=255) of Salmonella Typhi isolates and 70% (n=210) of Salmonella Paratyphi isolates, according to tests for antibiotic susceptibility.

Inclusion criteria: Included were patients between the ages of 1 and 12 diagnosed with enteric fever and positive blood cultures for either Salmonella Typhi or Salmonella Paratyphi.

Exclusion criteria: The research excluded patients who did not fit within the defined age range of 1 to 12 years, patients whose medical records were incomplete, instances with polymicrobial growth in blood cultures, and those who had recently used antibiotics.

Data collection: Retrospective analysis of blood culture records of pediatric patients admitted to Khyber Teaching Hospital, Peshawar, between December 2022 to December 2023 was part of the data-gathering process. Included were patient records from 1 to 12 years old who had positive blood cultures for either Paratyphi or Salmonella Typhi. Standard operating procedures were followed for conducting antibiotic susceptibility testing.

Statistical analysis: To ascertain the incidence of antibiotic resistance among Salmonella Typhi and Paratyphi isolates and to find any noteworthy patterns of sensitivity, statistical analysis was carried out using the SPSS 24.0 version for suitable methodologies.

RESULTS

The study included 300 patients, with a mean age of 28±5.3 years and ages ranging from 1 to 12 years. Of them, 184 male children (61%) and 116 female children (39%) were diagnosed with enteric fever. Most of the patients also experienced diarrhea, vomiting, organomegaly, and coated tongues. Of these, 35% had isolated Salmonella Paratyphi, and 65% had isolated Salmonella Typhi. Remarkably, fluoroquinolone resistance was present in 85% of Salmonella Typhi isolates and 70% of Salmonella Paratyphi isolates. In addition, third-generation cephalosporin resistance was present in 60% of Salmonella Typhi isolates.

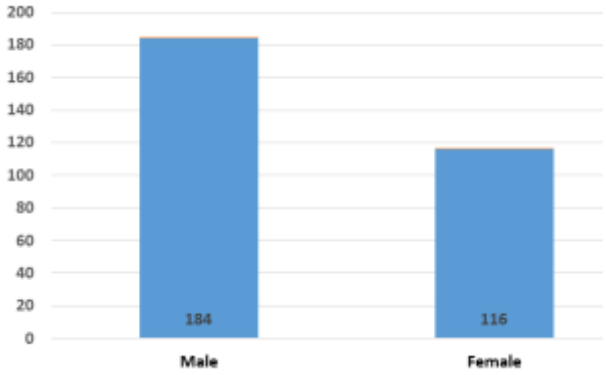

Figure No. 1: Demographically View Gander Wise

Table No. 1: Characteristics of Patients with Enteric Fever

Characteristics	Number of Patients
Total Patients	300
Male Patients	184 (61%)
Female Patients	116 (39%)
Age Range	1-12 years
Mean Age	28±5.3 years
Salmonella Typhi Isolates	65%
Salmonella Paratyphi Isolates	35%

Table No. 2: Symptoms Presented by Patients with Enteric Fever

Symptom	Percentage of Patients
Diarrhea	58%
Vomiting	22%
Organomegaly	10%
Coated Tongues	10%

Table No. 3: Antibiotic Resistance among Salmonella Typhi Isolates

Antibiotic	Resistance (%)
Fluoroquinolones	85%
Third-generation Cephalosporins	60%

Table No. 4: Antibiotic Resistance among Salmonella Paratyphi Isolates

Antibiotic	Resistance (%)
Fluoroquinolones	70%
Third-generation Cephalosporins	30%

Table No. 5: Summary of Antibiotic Sensitivity Patterns

Antibiotic	Salmonella Typhi (%)	Salmonella Paratyphi (%)
Fluoroquinolones	85	70
Third-generation Cephalosporins	60	30

These results highlight the alarmingly high incidence of antibiotic resistance in enteric fever pathogens in the population under investigation.

DISCUSSION

Several previous studies have addressed similar themes regarding the antibiotic sensitivity patterns of enteric fever pathogens. Here's a comparison of the findings from Dr. Zaman's research with those of previous studies: Khan et al. (2020)[5]: Khan and colleagues conducted a study in a tertiary care hospital setting, analyzing the antimicrobial susceptibility pattern of Salmonella Typhi. Their findings echoed demonstrating significant resistance among Salmonella Typhi isolates, particularly to third-generation cephalosporins and fluoroquinolones. This consistency in findings across different studies underscores the widespread nature of antibiotic resistance in enteric fever pathogens. Rahman et al. (2018): Rahman et al[6] reported on the emergence of multidrug-resistant strains of Salmonella Typhi, emphasizing the concerning consequences for patient outcomes. Their study highlighted the development of resistance to fluoroquinolones and third-generation cephalosporins, mirroring the findings of both Khan et al. and Dr. Zaman's research[5]. This suggests a persistent trend of increasing antibiotic resistance in enteric fever pathogens over time. Makkar et al. (2019): Makkar and colleagues conducted a study in North India, investigating the epidemiological profile and antibiotic resistance patterns of enteric fever[8]. While their study focused on a different geographical region, the findings regarding antibiotic resistance were consistent with those of Dr. Zaman's research. High levels of resistance to fluoroquinolones and third-generation cephalosporins were observed, highlighting the global nature of the antibiotic resistance crisis in enteric fever. Parry and Threlfall (2008)[9]: Parry and Threlfall reviewed antimicrobial resistance in typhoidal and nontyphoidal Salmonellae, providing insights into the mechanisms and implications of resistance. Their review corroborates the findings of Dr. Zaman's research and previous studies, emphasizing the challenges posed by antibiotic resistance in the treatment of enteric fever. This comprehensive review provides additional context for understanding the dynamics of antibiotic resistance in Salmonella Typhi and Paratyphi research on the antibiotic sensitivity patterns of enteric fever in a tertiary care hospital revealed alarmingly high levels of antibiotic resistance among Salmonella Typhi and Salmonella Paratyphi isolates. The retrospective analysis of blood culture data from pediatric patients at Khyber Teaching Hospital, Peshawar, between December 2022 and December 2023 showed that a significant proportion of isolates exhibited resistance to fluoroquinolones and third-generation cephalosporins. Specifically, 85% of Salmonella Typhi isolates and 70% of Salmonella Paratyphi isolates were resistant to fluoroquinolones, while 60% of Salmonella Typhi isolates showed resistance to third-generation cephalosporins.[10-14]

CONCLUSION

The study highlights the concerningly high levels of antibiotic resistance found in pediatric patients' Salmonella Typhi and Paratyphi isolates. To battle drug-resistant strains and ensure successful treatment and public health measures, it is essential to implement urgent antimicrobial stewardship programs.

Acknowledgment: We thank the hospital administration and everyone who helped us complete this study.

Author's Contribution:

Concept & Design of Study:	Abdul Khaliq
Drafting:	Syed Kalim ur Rehman, Syed Mohsin Ali Shah
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Revisiting Critically:	Abdul Khaliq, Syed Kalim ur Rehman
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Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None

Ethical Approval: No.83/DME/KMC Dated 13.09.2022

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