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Case Series

The Silent threat of Pediatric Shigellosis: A case series of MDR and XDR Shigella highlighting the importance of diagnostic and antibiotic stewardship

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ABSTRACT

Shigellosis remains a major cause of acute invasive diarrhoea in children worldwide. The emergence of extensively drug-resistant (XDR) Shigella strains resistant to all major first-line and alternative antimicrobial agents has become an important public health concern. Reports from India remain limited, particularly from the northeastern region.

We describe a case series of three pediatric patients with culture-confirmed shigellosis managed at a tertiary care hospital in Northeast India between October 2025 and June 2026. The cases demonstrated diverse clinical presentations ranging from mild outpatient-managed disease to severe dysentery requiring hospitalization. Case 1 involved a 2-year-9-month-old male child with dysentery and concurrent acute upper respiratory tract infection who demonstrated clinical improvement following multiple antimicrobial modifications. Case 2 was a 5-year-old female child presenting with mucoid blood-stained stools and mild systemic symptoms managed conservatively in the outpatient setting. Case 3 involved a 3-year-old female with acute dysentery caused by extensively drug-resistant Shigella sonnei.

All patients recovered without complications. The series highlights the broad clinical spectrum of pediatric shigellosis and underscores the growing challenge posed by antimicrobial resistance, including the emergence of XDR Shigella in the community. Routine stool culture, antimicrobial susceptibility testing, and strengthened surveillance remain essential for guiding therapy and supporting antimicrobial stewardship initiatives

Keywords*: Shigella; pediatric dysentery; antimicrobial resistance; multidrug-resistant; extensively drug-resistant; Shigella sonnei; India.*

INTRODUCTION

Shigellosis remains a major global cause of diarrhoeal disease, accounting for an estimated 80–165 million cases and approximately 600,000 deaths annually, disproportionately affecting children under five years of age, who account for nearly 70% of cases and 60% of Shigella-related deaths; although *Shigella flexneri* has historically predominated in India and other low- and middle-income countries, recent reports indicate an increasing emergence of *Shigella sonnei*, particularly drug-resistant and extensively drug-resistant (XDR) strains, posing significant therapeutic and public health challenges. [1] It is highly contagious and is transmitted predominantly through the feco-oral route via contaminated food and water, infected fingers, fomites, and flies, facilitating rapid spread. The disease spectrum ranges from self-limiting watery diarrhoea to severe dysentery associated with dehydration, seizures, and systemic complications. Historically, *Shigella flexneri* has been the predominant species in developing countries, whereas *Shigella sonnei* has been more commonly associated with industrialised nations. However, recent studies suggest a changing epidemiological pattern with increasing isolation of *S. sonnei* from developing regions, including India. [2–4]

Antimicrobial therapy shortens disease duration, reduces bacterial shedding, and prevents complications in severe shigellosis. Unfortunately, *Shigella* has progressively acquired resistance to multiple antimicrobial classes. Resistance initially emerged against ampicillin and trimethoprim-sulfamethoxazole, followed by nalidixic acid and fluoroquinolones. [2,3] Subsequent reports described reduced susceptibility and resistance to third-generation cephalosporins and azithromycin, leaving limited therapeutic options. [5].

The recent emergence of extensively drug-resistant (XDR) *Shigella* strains, represents a major public health challenge. Reports of XDR *Shigella sonnei* have increasingly emerged from several countries, highlighting its global spread and clinical significance. [6–9] The elevated resistance levels are often the consequence of the horizontal transfer of complex resistance determinants including plasmids, integrons, and transposons. [3]

Indian data regarding XDR *Shigella* remain scarce, and reports from Northeast India are lacking. [4,5]

Case Series

Case 1. A 2-year-9-month-old boy was admitted with high-grade fever, loose stools, vomiting, poor oral intake, and symptoms suggestive of an acute respiratory tract infection. Initial investigations revealed leukocytosis and markedly elevated inflammatory markers (CRP 68.64 mg/L). Despite empirical therapy, persistence of mucus- and blood-stained stools necessitated multiple antimicrobial modifications. Stool culture subsequently yielded *Shigella* spp., following which treatment was tailored. The child showed gradual clinical improvement with normalization of inflammatory markers and was discharged in stable condition after three days.

Case 2. In contrast, a 5-year-old girl presented on an outpatient basis with a milder illness characterized by semisolid mucoid blood-stained stools, low-grade fever and dribbling of urine. She remained clinically stable without systemic toxicity or dehydration. Stool culture later confirmed *Shigella* spp. infection. Conservative management with oral hydration, zinc supplementation, probiotics, and symptomatic therapy resulted in complete recovery without hospitalization.

Case 3. The most striking case involved a previously healthy 3-year-old girl who presented with fever, vomiting, and multiple episodes of mucoid blood-stained stools. There was no history of travel, prior antibiotic exposure, immunodeficiency, or other recognized epidemiological risk factors except for the intake of food from street vendor. Stool culture yielded *Shigella sonnei*, and antimicrobial susceptibility testing revealed resistance to ampicillin, trimethoprim-sulfamethoxazole, ciprofloxacin, third-generation cephalosporins, and azithromycin, fulfilling the current definition of extensively drug-resistant (XDR) *Shigella*. Notably, despite the alarming resistance profile, the child improved clinically with supportive care and was discharged after a short hospital stay.

\Together, these three cases capture the evolving face of pediatric shigellosis—from mild community-acquired disease managed conservatively to severe dysentery caused by an XDR isolate—highlighting the indispensable role of stool culture and antimicrobial susceptibility testing in guiding patient management and informing antimicrobial stewardship efforts.
The demographic, clinical, microbiological, treatment, and outcome characteristics of the three cases are summarized as follows-

Table 1. Clinical, Microbiological, Treatment and Outcome Characteristics of the Three Cases

Parameter	Case 1	Case 2	Case 3
Demography	2 years 9 months, Male	5 years, Female	3 years, Female
Clinical Presentation	High-grade fever, loose stools, vomiting, poor oral intake, upper respiratory tract infection symptoms	Mild fever, mucoid blood-stained stool, dribbling urine	Fever, vomiting, multiple episodes of mucoid blood-stained stool
Stool Routine Examination	Brownish semisolid stool, acidic reaction, plenty pus cells, no ova/cyst; vegetable cells and starch granules present	Mucoid blood-stained stool, few pus cells, no RBC.	Greenish mucoid stool, mucus present, acidic reaction, plenty pus cells, few RBCs, no ova/cyst; vegetable cells and starch granules present
Stool Culture Report	*Shigella* spp. isolated	*Shigella* spp. isolated	*Shigella sonnei* isolated
Treatment	IV fluids, azithromycin, probiotics, zinc; later amikacin, cefixime and oral meropenem	Oral hydration, probiotics, zinc and symptomatic treatment	IV fluids, ceftriaxone, probiotics, zinc and supportive care
Outcome	Clinical recovery; CRP decreased from 68.64 to 9.87 mg/L	Symptomatic recovery on follow-up	Clinical recovery and discharge after 3 days

Final Diagnosis	MDR Shigellosis with acute respiratory tract infection	Mild community-acquired shigellosis MDR pattern	XDR *Shigella sonnei* dysentery

Table 2. Antimicrobial Susceptibility Profile of Three *Shigella* Isolates

CLSI Tier	Antimicrobial Agent	Case 1	Case 2	Case 3
Tier 1	Ampicillin	R (6 mm)	R(6 mm)	R (6 mm)
	Ciprofloxacin	R (≥4 µg/mL)	R (≥4 µg/mL)	R (4 µg/mL)
	Cotrimoxazole	S (20 µg/mL)qa	S (20 µg/mL)	R (≥320 µg/mL)
	Ceftriaxone	R (32 µg/mL)	R (32 µg/mL)	R (32 µg/mL)
	Cefotaxime	R (32 µg/mL)	R (32 µg/mL)	R (32 µg/mL)
Tier 2	Azithromycin	R (6 mm)	R	R (6 mm)
Tier 4 (Reserve)	Ertapenem	S (≤0.12 µg/mL)	S (≤0.12 µg/mL)	S (≤0.12 µg/mL)
	Imipenem	S (≤0.25 µg/mL)	S (≤0.25 µg/mL)	S (≤0.25 µg/mL)
	Meropenem	S (≤0.25 µg/mL)	S (≤0.25 µg/mL)	S (≤0.25 µg/mL)
Additional agents tested	Amoxicillin–clavulanate	S (8 µg/mL)	- S (8 µg/mL)	S (≤2 µg/mL)
	Cefuroxime	R (≥64 µg/mL)	R (≥64 µg/mL)	NT
	Cefepime	NT	S (2 µg/mL)	S (1 µg/mL)
	Piperacillin–tazobactam	S (≤4 µg/mL)	S (≤4 µg/mL)	S (≤4 µg/mL)
	Cefoperazone–sulbactam	S (≤8 µg/mL)	S (≤8 µg/mL)	S (≤8 µg/mL)
	Gentamicin	R (≤1 µg/mL)	R (≤1 µg/mL)	R (≤1 µg/mL)
	Amikacin	R (2 µg/mL)	R (2 µg/mL)	R (2 µg/mL)
	Colistin	I (≤0.5 µg/mL)	I (≤0.5 µg/mL)	I (≤0.5 µg/mL)
Final Phenotype		**MDR *Shigella***	**MDR *Shigella***	**XDR *Shigella sonnei***

DISCUSSION

The emergence of extensively drug-resistant (XDR) *Shigella* has significantly complicated the management of shigellosis worldwide. Traditionally, *Shigella flexneri* predominated in developing countries, whereas *Shigella sonnei* was largely confined to industrialized settings. However, recent Indian studies have demonstrated the increasing dominance of ciprofloxacin-resistant *S. sonnei*, suggesting an evolving epidemiological transition. [4,5]

Our case series illustrates the evolving antimicrobial resistance spectrum of pediatric shigellosis, ranging from multidrug-resistant (MDR) *Shigella* spp. to extensively drug-resistant (XDR) *Shigella sonnei*. Cases 1 and 2 demonstrated MDR phenotypes with resistance to multiple first-line agents, whereas Case 3 fulfilled the contemporary CDC definition of XDR *Shigella*, exhibiting resistance to ampicillin, trimethoprim-sulfamethoxazole, ciprofloxacin, third-generation cephalosporins, and azithromycin while retaining susceptibility to carbapenems and selected β-lactam/β-lactamase inhibitor combinations. This progression within a small pediatric cohort reflects the rapidly evolving resistance landscape and narrowing therapeutic options for shigellosis.

Although global reports of XDR shigellosis are increasing, pediatric cases remain relatively uncommon. A recent 10-year paediatric study demonstrated a concerning rise in ceftriaxone-resistant *S. sonnei* infections since 2022, highlighting the progressive erosion of effective treatment options in children. [10]Similarly, CDC surveillance from the United States reported an increase in XDR *Shigella* isolates from 0% during 2011–2015 to 8.5% in 2023, with only 3.9% of infections occurring in individuals younger than 18 years. Most reported XDR cases have been associated with men who have sex with men (MSM), international travel, HIV infection, and interconnected transmission networks.[5] Additional reports from the United States, France, and Australia further illustrate the expanding global dissemination of XDR *S. sonnei*.[8,9,11]

In contrast, all three children in our series lacked these established epidemiological risk factors. The XDR case occurred in a previously healthy three-year-old girl with no travel history, prior antibiotic exposure, or immunodeficiency, while the two MDR cases also represented community-acquired infections in immunocompetent children. These observations suggest that resistant *Shigella* strains are increasingly circulating within the community and may no longer be confined to recognized high-risk populations, emphasizing the need for routine stool culture, antimicrobial susceptibility testing, and sustained antimicrobial resistance surveillance in pediatric diarrhoeal disease.

A noteworthy finding was the favourable clinical outcome in all three children, including the patient with XDR *S. sonnei*, despite empirical ceftriaxone therapy in the presence of in vitro ceftriaxone resistance (MIC 32 µg/mL). This finding should

not be interpreted as evidence supporting empirical ceftriaxone use for resistant shigellosis. Rather, it highlights the self-limiting nature of some *Shigella* infections and the crucial role of timely supportive management, including adequate hydration, zinc supplementation, and close clinical monitoring. Nevertheless, stool culture with antimicrobial susceptibility testing remains indispensable in hospitalized children with dysentery to guide targeted antimicrobial therapy, facilitate antimicrobial de-escalation where appropriate, and strengthen antimicrobial stewardship programmes.[13]

Indian literature has predominantly reported multidrug-resistant (MDR) *Shigella* isolates with increasing resistance to fluoroquinolones and third-generation cephalosporins, whereas reports fulfilling the contemporary CDC definition of XDR *Shigella* remain uncommon, particularly in the pediatric population.[4,5,12] The coexistence of two MDR isolates and one XDR isolate within a short period at a single tertiary care centre may reflect the ongoing evolution of antimicrobial resistance in the region. Although this small case series cannot define transmission dynamics, it suggests that highly resistant *Shigella* strains may already be circulating within the community rather than being confined to healthcare settings or traditionally recognized high-risk groups. Continued microbiological surveillance, molecular characterization, whole-genome sequencing, and multicentric antimicrobial resistance surveillance are essential to better understand resistance mechanisms, transmission pathways, and the true burden of MDR and XDR *Shigella* in Northeast India.[11,14]

CONCLUSION

This case series highlights the evolving spectrum of pediatric shigellosis, ranging from multidrug-resistant (MDR) *Shigella* to community-acquired extensively drug-resistant (XDR) *Shigella sonnei* with varied clinical presentation. It underscores the importance of routine stool culture with antimicrobial susceptibility testing in children presenting with dysentery to enable early microbiological diagnosis, guide targeted antimicrobial therapy, and support antimicrobial stewardship. Given the highly contagious nature of shigellosis, education of caregivers regarding meticulous hand hygiene, safe food and water practices, appropriate sanitation, and environmental cleaning remains essential, alongside timely diagnosis and infection prevention measures, to reduce secondary transmission and prevent outbreaks within households, childcare settings, and schools. Continued microbiological surveillance, molecular characterization, whole-genome sequencing, and multicentric antimicrobial resistance surveillance are essential to better understand resistance mechanisms, transmission pathways, and the true burden of **MDR and XDR *Shigella*** in India, strengthening antimicrobial stewardship programmes, and limiting the spread of this emerging public health threat.[13]

Limitations

Serotyping was not performed for all isolates, and molecular characterization, including resistance gene detection and whole-genome sequencing, was unavailable; therefore, resistance mechanisms and clonal relatedness could not be established. Additionally, this was a small single-centre case series, limiting the generalizability of the findings.

Ethics Statement

Ethical approval was obtained as this manuscript describes a retrospective case series prepared from routine clinical care with complete anonymization of patient information.

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Conflict of Interest

The authors declare that they have no competing interests.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. No additional datasets were generated beyond those included in this article.

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