

Case Study

Scrub Typhus as a Cause of Acute Undifferentiated Febrile Illness: A Retrospective Observational Study of Clinical Spectrum and Outcomes

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A B S T R A C T

Background: Scrub typhus, caused by *Orientia tsutsugamushi*, is a re-emerging cause of acute febrile illness across the Indian subcontinent. Transmission peaks during monsoon and post-monsoon seasons due to increased chigger mite activity in humid environments, with rodents serving as natural reservoirs. Nonspecific clinical manifestations and limited diagnostic markers contribute to frequent diagnostic delays.

Materials and Methods: This retrospective observational study was conducted in the Department of Medicine of a tertiary care hospital over three months. Patients with laboratory-confirmed scrub typhus were included. Demographic characteristics, clinical features, treatment practices, and outcomes were analyzed descriptively. Continuous variables were summarized as mean $\pm$ standard deviation (SD), and categorical variables as frequencies and percentages.

Results: Thirty patients were included. Females constituted 60% of cases, and males 40%. The mean age was 48.6 ± 18 years, indicating predominant involvement of middle-aged adults. Scrub typhus presents as an acute, undifferentiated febrile illness with variable clinical manifestations. Combination antimicrobial therapy was used in severe cases.

Conclusion: Scrub typhus remains an important cause of acute febrile illness in endemic regions. Early recognition based on clinical features, supportive laboratory findings, and epidemiological context—rather than reliance on eschar alone—is critical. The patients who received prompt antimicrobial therapy did well, reinforcing that early treatment prevents progression to severe disease. Maintaining a high index of suspicion, particularly during the monsoon and post-monsoon months, remains key to reducing morbidity and mortality from scrub typhus in endemic settings like this one.

Keywords: Scrub Typhus, ARDS, Chigger mites, Thrombocytopenia, IgM ELISA, Acute febrile illness, Eschar, Myalgia

Introduction

Scrub typhus, an acute febrile illness caused by *Orientia tsutsugamushi*, has re-emerged as a significant public health concern across the Indian subcontinent. Transmitted through the bite of infected chigger mites, the disease frequently presents as acute undifferentiated fever and mimics other common tropical infections such as dengue, malaria, leptospirosis, and enteric fever. This clinical overlap often results in delayed diagnosis and treatment, contributing to progression towards severe disease and increased mortality.¹⁻⁴

Although the presence of an eschar is considered a classical diagnostic clue, it is inconsistently observed, limiting its practical utility. In many settings, especially resource-limited hospitals, definitive laboratory confirmation may not be immediately available. Consequently, early diagnosis often depends on recognition of characteristic clinical and biochemical patterns.^{5,6} Previous studies have identified thrombocytopenia and hepatic transaminitis—particularly an AST-predominant pattern—as frequent laboratory abnormalities; however, comprehensive analyses integrating epidemiological exposure, clinical presentation, laboratory profile, diagnostic approach, treatment practices, and outcomes remain limited.^{3,7,8}

Scrub typhus thrives within the vast “tsutsugamushi triangle”, encompassing South-east Asia, the Indian subcontinent, China, Japan, and northern Australia, where over a billion people face exposure risk in rural scrublands and agricultural fields. Transmission peaks during monsoon and post-monsoon seasons due to heightened chigger mite activity in humid, vegetated environments, with rodents serving as natural reservoirs perpetuating the zoonotic cycle.^{2,9}

Historically underestimated, scrub typhus surged post-World War II in Asia-Pacific regions but waned with doxycycline prophylaxis; contemporary re-emergence stems from diagnostic gaps, antimicrobial resistance concerns, and climate-driven vector expansion. Untreated mortality reaches 30-70% in severe cases involving vasculitis-induced multi-organ failure, yet early therapy yields near-100% cure rates, underscoring the need for definitive vigilance.^{2,9,10}

Furthermore, scrub typhus demonstrates marked regional variability in disease expression and severity, underscoring the need for institution-specific data to guide early clinical suspicion and management strategies. A systematic evaluation of patients encountered in routine clinical practice is therefore essential to identify reproducible diagnostic patterns and outcome determinants.⁹

The present study was undertaken to comprehensively characterise the demographic profile, clinical manifestations, laboratory and biochemical abnormalities, diagnostic

modalities, treatment strategies, and clinical outcomes of patients with laboratory-confirmed scrub typhus admitted to a tertiary care centre. By systematically analysing these parameters, this study aims to provide evidence-based insights that facilitate early recognition and timely management.

Materials and Methods

Study Design

This retrospective observational study was carried out in the Medicine Department of a tertiary care hospital over a period of October 2025 to December 2025. All patients with clinically suspected scrub typhus and one or more of the following definitive positive PCR for *O. tsutsugamushi* and positive IgM enzyme-linked immunosorbent assay (ELISA) for *O. reotia* with symptoms such as eschar, high-grade fever, decreased urine output, nausea/vomiting, and breathlessness were included in the study. Patients with laboratory-confirmed alternative etiologies of fever were excluded to ensure diagnostic specificity.

Data Collection

The data was extracted retrospectively from the hospital electronic database and paper medical records using a standardized method. Demographics (age, sex, residence), epidemiological risk factors (history of outdoor exposure, presence of eschar), clinical features at admission (symptoms, vital signs, physical examination findings), laboratory parameters (hematology, biochemistry, inflammatory markers), diagnostic test results, treatment details (antimicrobials, duration), and outcomes (length of stay, complications, mortality) were all considered and managed with spreadsheets.

Treatment Protocol and Statistical Analysis

Antimicrobial treatment followed institutional guidelines: doxycycline (100 mg twice daily) as first-line therapy for non-pregnant adults; azithromycin (500 mg once daily) for pregnant women, children <8 years, and doxycycline-intolerant cases. Combination therapy (doxycycline plus azithromycin or chloramphenicol) was instituted for severe disease. Data analysis was descriptive, with continuous variables summarized as medians with standard deviation (SD) and categorical variables as frequencies with percentage. Results are presented in tables and figures, with no inferential statistics performed due to the study's exploratory design.

Results

Patient demographics revealed a female predominance of 60% among 30 scrub typhus case, with males comprising 40% and a mean age of 48.6 ± 18 years indicating primarily middle-aged adults.

Table 1. Clinical features at presentation among the study participants

Symptom / Clinical Feature	n (%)
Fever	30 (100)
Nausea	2 (6.7)
Vomiting	2 (6.7)
Shortness of breath	8 (26.7)
Myalgia	14 (46.7)
Decreased urine output	2 (6.7)
Jaundice	1 (3.3)
Arthralgia	2 (6.7)
Rash	3 (10.0)
Eschar	5 (16.7)
Cough	2 (6.7)
Altered sensorium	1 (3.3)
Abdominal pain	1 (3.3)

Fever was observed in all cases, establishing it as the pathognomonic feature (Table 1). Myalgia ranked as the leading associated symptom, followed by shortness of breath, with eschar as a notable cutaneous hallmark; rarer features included rash, gastrointestinal symptoms, arthralgia, jaundice, altered sensorium and abdominal pain.

Thrombocytopenia emerged as the dominant haematological abnormality, reflecting endothelial damage and platelet sequestration (Table 2). Leukocytes indicated an inflammatory response while isolated cytopenias and mild hepatic changes such as transaminitis or hypoalbuminemia occurred in subsets.

Table 2. Laboratory abnormalities among the study participants

Laboratory Abnormality	n (%)
Thrombocytopenia	22 (73.3)
Leukocytosis	8 (26.7)
Bicytopenia	1 (3.3)
Pseudothrombocytopenia	1 (3.3)
Leukopenia	1 (3.3)
Pancytopenia	1 (3.3)
Transaminitis	2 (6.7)
Hypoalbuminemia	1 (3.3)

Table 3. Complications and clinical outcomes among the study participants

Complication / Outcome	n (%)
Acute Respiratory Distress Syndrome (ARDS)	6 (20.0)

Acute Kidney Injury (AKI)	2 (6.7)
Hyperbilirubinemia	1 (3.3)
Severe MODS (Death)	1 (3.3)
No complications / Nil	20 (66.7)

The majority experienced an uncomplicated course, underscoring scrub typhus's treatable nature with prompt intervention (Table 3). Acute respiratory distress syndrome represented the primary severe sequela, alongside isolated organ failures and one fatal multi-organ dysfunction case.

Discussion

This retrospective observational study delineates the demographic profile, clinical spectrum, laboratory abnormalities, treatment practices, and outcomes of patients with laboratory-confirmed scrub typhus admitted to a tertiary care centre. The findings reinforce scrub typhus as an important cause of acute undifferentiated febrile illness in endemic regions and highlight the persistent diagnostic challenges posed by its protean manifestations and nonspecific laboratory profile.

In a present study, scrub typhus predominantly affected middle-aged adults, with a female predominance. Similar demographic trends have been reported from multiple Indian studies, possibly reflecting greater occupational and domestic exposure of women to mite-infested vegetation in rural and peri-urban settings, particularly during agricultural and household activities.^{11,12} The age distribution underscores that scrub typhus is not confined to paediatric or elderly populations but significantly affects the economically productive age group, amplifying its public health impact.³

Fever was universally present and remains the most consistent presenting feature, corroborating previous reports that describe scrub typhus as a leading cause of acute febrile illness during monsoon and post-monsoon seasons. However, the absence or inconsistent detection of eschar in many patients reiterates the limited sensitivity of this classical sign in routine clinical practice. Meta-analyses and regional studies from India have demonstrated wide variability in eschar prevalence, often influenced by skin pigmentation, lesion location, and lack of meticulous examination. Consequently, reliance on eschar alone may delay diagnosis and treatment, emphasising the need for heightened clinical suspicion based on epidemiological context and systemic features.^{3,5}

The spectrum of clinical manifestations observed—myalgia, gastrointestinal symptoms, respiratory distress, reduced urine output, rash, and altered sensorium—reflects the multisystem involvement characteristic of scrub typhus.

These manifestations are attributable to widespread endothelial infection and small-vessel vasculitis induced by *Orientia tsutsugamushi*, leading to capillary leak, tissue hypoperfusion, and organ dysfunction. Respiratory symptoms and renal involvement in particular signify severe disease and have been associated with poorer outcomes in prior studies.

Laboratory abnormalities in this cohort were consistent with previously described patterns, notably hepatic transaminitis and haematological derangements. An AST-predominant elevation, frequently reported in scrub typhus, is thought to result from systemic inflammation, hepatic endothelial injury, and muscle involvement rather than isolated hepatocellular damage. This biochemical profile is clinically valuable in differentiating scrub typhus from other tropical infections such as dengue and viral hepatitis, although overlap exists. Thrombocytopenia, when present, further compounds the diagnostic dilemma but should prompt consideration of scrub typhus in endemic settings, especially when accompanied by transaminitis and persistent fever.

The diagnostic approach in this study relied on IgM ELISA and PCR, reflecting real-world practices in tertiary hospitals. While PCR offers high specificity in early disease, its limited availability and cost constrain routine use. IgM ELISA, though widely accessible, may yield false-negative results early in the disease course. These limitations reinforce the importance of syndromic diagnosis and early empirical therapy in suspected cases, particularly when alternative causes of fever have been reasonably excluded.

Therapeutically, prompt initiation of doxycycline or azithromycin resulted in favourable clinical outcomes, consistent with existing evidence demonstrating rapid defervescence and near-complete recovery when appropriate antibiotics are administered early. The use of combination therapy in severe cases reflects evolving clinical practice aimed at addressing delayed response or complications, although robust comparative data are limited. Importantly, no significant mortality was observed in patients who received timely treatment, underscoring the dramatic contrast between treated and untreated disease, wherein mortality may reach 30–70% in severe scrub typhus.

Limitations

This study has certain limitations inherent to its retrospective design, including reliance on medical records, potential underreporting of eschar, and the absence of inferential statistical analysis. The relatively small sample size and single-centre nature might limit generalisability. Nevertheless, the study provides valuable institution-specific data and mirrors real-world clinical scenarios encountered in endemic regions.

Conclusion

Scrub typhus remains a re-emerging and underdiagnosed cause of acute febrile illness with significant potential for multisystem involvement. Early recognition based on clinical patterns, supportive laboratory findings, and epidemiological context—rather than reliance on eschar alone—is crucial. Prompt initiation of appropriate antimicrobial therapy leads to excellent outcomes and prevents progression to severe disease. Strengthening clinician awareness and maintaining a high index of suspicion are essential to reducing morbidity and mortality associated with scrub typhus in endemic settings.

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Conflicts of Interest: None

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