

Study of Clinical and Demographic Profile of Scrub Typhus Patients Admitted to a Tertiary Care Hospital in Central India

A. V. Daphale, Amit Achliya, Neel Chhajed, Vikram Rode, Kasturi Bhise

Department of General Medicine, Dr. PDMMC Amravati, Maharashtra, India

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Correspondence:

Neel Ajit Chhajed,
Department of General
Medicine, Dr. PDMMC Amravati,
Maharashtra State, India.
Email: chhajedn4@gmail.com

Abstract

Objectives: To study epidemiological characteristics, clinical features, laboratory findings, and clinical outcomes in cases of scrub typhus. Additionally, the study aims to identify the predictors of disease severity.

Methods: This cross-sectional study was conducted in the Department of General Medicine at Dr. PDM Medical College in Amravati, India. The study duration was 6 months, from July 2023 to December 2023. All clinically confirmed patients with scrub typhus were evaluated through history, clinical examination, and appropriate laboratory investigations. The clinical and laboratory profiles, hospital course, and outcomes were analyzed. Organ dysfunction upon admission was assessed using the sequential organ failure assessment (SOFA) score.

Results: A total of 200 cases were included in the study. The majority of the cases were in the age range of 31–40 years, and most of them were males. The highest number of scrub typhus cases occurred in September. The most common presenting symptoms were fever (81%), followed by nausea (37.5%), generalized weakness (34%), abdominal pain, eschar (21.5%), breathlessness, and cough (21% each), headache (19%), vomiting (15%), and altered sensorium (4.5%). The majority of patients (72.5%) did not experience any complications, while 55 patients (27.5%) developed multi-organ dysfunction syndrome (MODS) as a complication. The mortality rate was 1%.

Conclusion: Scrub typhus is a significant cause of acute febrile illness in the Vidarbha region of Maharashtra. It can present with various clinical manifestations, with or without an eschar. Early diagnosis and appropriate treatment of these cases can lead to minimal complications.

Keywords: Clinical profile, Eschar, multi-organ dysfunction syndrome, scrub typhus

Introduction

Scrub typhus is a rickettsial infection that continues to be a significant public health challenge in the Asia-Pacific region. It is a vector-borne disease caused by *Orientia tsutsugamushi*.¹ The disease is transmitted through the bite of infected chiggers, specifically the *Leptotrombidium* mite.² Scrub typhus can present with a wide range of clinical manifestations, from mild febrile

illness to severe multi-organ dysfunction.³

The geographical distribution of scrub typhus extends from the far eastern parts of Russia in the north to Australia in the south, and from Japan in the east to Afghanistan in the west, forming a vast “tsutsugamushi triangle”.⁴ Over a billion people are susceptible to infection by *Orientia tsutsugamushi*. Despite its widespread prevalence in India and the potential severity of the disease, scrub typhus is often under-recognized and underreported

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due to its varied clinical presentations.⁵

The clinical presentation of scrub typhus can be diverse, ranging from non-specific symptoms such as fever, headache, myalgia, and cough, to more severe manifestations such as pneumonitis, acute renal failure, meningitis, and disseminated intravascular coagulation.⁶ The hallmark of scrub typhus is the presence of an eschar at the site of the chigger bite. While this characteristic skin lesion is a critical diagnostic clue, it may not be present in many cases.⁷ Therefore, it is important to be aware of the variability in clinical presentation and maintain a high index of suspicion for scrub typhus in endemic areas, particularly during the peak transmission seasons.⁸

The diagnosis of scrub typhus relies on a combination of clinical suspicion and confirmatory laboratory tests. The Weil-Felix test, which was once popular, is neither sensitive nor specific. Modern diagnostic techniques, such as the indirect immunofluorescence assay (IFA), enzyme-linked immunosorbent assay (ELISA), and polymerase chain reaction (PCR), offer higher accuracy but may not be universally available in resource-limited settings where scrub typhus is endemic.⁹

Prompt administration of antibiotics is generally effective in the treatment of scrub typhus. Doxycycline is the first-line drug used for treatment in men and non-pregnant women. It is highly effective in patients with scrub typhus. However, there are challenges in the management of this disease, including delays in diagnosis. Another problem is the development of antibiotic resistance, as well as the need for alternative treatment in pregnant women (since doxycycline is contraindicated) and patients with severe allergies to first-line antibiotics. The potential for severe complications and mortality associated with untreated or improperly treated scrub typhus emphasizes the importance of early detection and appropriate antimicrobial therapy.¹⁰

In light of these considerations, the present study aims to investigate the epidemiological features, clinical profile, laboratory features, and clinical outcomes in scrub typhus cases. Furthermore, it aims to identify predictors of disease severity and examine their correlation with disease mortality.

Methods

This study was a cross-sectional study conducted during a scrub typhus outbreak in central India from July 2023 to December

2023. The protocol was approved by the Ethical Committee of Dr. PDM Medical College, and consent was obtained from all study participants. The study included clinically confirmed scrub typhus adult patients who provided written consent and were admitted to Dr. PDMMC and a tertiary-care hospital. Patients under 18 years of age, those who refused consent, those with immunocompromised status or uncontrolled systemic diseases, and those later found to have fever from other causes were excluded. The study duration was 6 months (July 2023 to December 2023).

A total of 200 cases were collected for the study. The sample size was calculated using the formula

$$N=(Z_{\alpha}^2) \times SD^2/d^2$$

and the OPENEPI software version 3, assuming 90% power and a 95% confidence interval. Demographic details such as age, gender, and area of residence were recorded for all cases. Detailed medical history, previous treatments, and existing health conditions were documented. A comprehensive history of the duration of symptoms and specific signs and symptoms was also noted. Thorough clinical examinations, including general and systemic examinations, were conducted. Patients were also examined for the presence of characteristic eschar. Vital signs were recorded, and necessary laboratory tests, including blood, urine, and sputum cultures, as well as a smear test for acid-fast bacilli using the Ziehl-Neelsen method, were performed.

The diagnosis was confirmed using IgM enzyme-linked immunosorbent assay (ELISA) test (InBios International Inc., USA), which identifies IgM antibodies against a specific 56 kDa antigen. Further investigations in the study cases included the Mantoux test, chest X-ray, and abdominal ultrasound. In selected cases, contrast-enhanced CT scans of the thorax and abdomen, CT brain, and cerebrospinal fluid analysis were also performed. Biochemical tests, such as fasting blood sugar, renal function tests, and liver function tests, were conducted for all cases. Once the diagnosis was confirmed, patients were treated with Doxycycline, starting at 200 mg daily with adjustments based on the severity of the disease. Antibiotic treatment was modified according to the severity of illness. Clinical features, laboratory investigations, hospital course, and patient outcomes were carefully recorded.

Patients with serious complications, such

Table 1 Baseline Characteristics of the Cases

Baseline Characteristic		Number of Cases n=200	Percentage
Age (years)	≤10	16	8.00
	11-20	24	12.00
	21-30	37	18.50
	31-40	43	21.50
	41-50	29	14.50
	51-60	26	13.00
	61-70	16	8.00
	71-80	9	4.50
Gender	Male	113	56.50
	Female	87	43.50
Residence	Rural	159	79.50
	Urban	41	20.50
Occupation	Farmer	84	42.00
	Laborer	83	41.50
	School going	33	16.50

as septic shock, acute respiratory distress syndrome (ARDS), or signs of hepatic or renal failure, received appropriate intensive care. The Sequential Organ Failure Assessment (SOFA) score was used to assess the extent and severity of organ dysfunction.¹¹ The collected data was organized in Microsoft Excel and analyzed using SPSS software. The analysis involved comparing averages with the Student t-test and assessing qualitative variables using the Chi-square and Fisher’s exact tests. A

p-value below 0.05 was considered statistically significant.

Results

A total of 200 cases of scrub typhus were examined, resulting in a response rate of 100%. The majority of patients, 43 (21.5%), belonged to the 31-40 years age group, followed by 37 (18.5%) in the 21-30 years age group, and 29 (14.5%) in the 41-50 years age

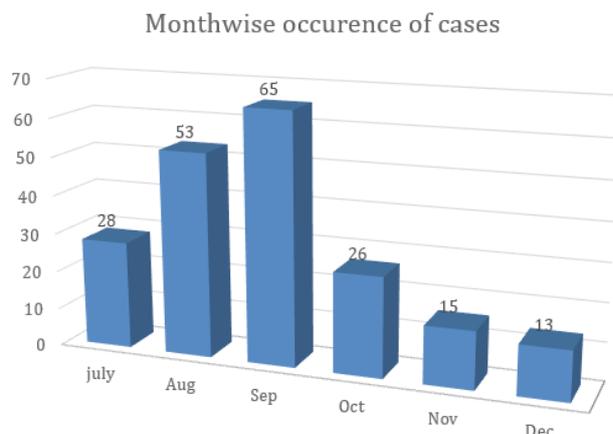


Fig.1 Monthly Incidence of Scrub Typhus in Studied Cases

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Table 2 Laboratory Profile of the Studied Cases

	Value	Number of cases n=200	Percentage
Hemoglobin	Normal (12 gm/dL or above)	198	99.00
	Reduced (<12 gm/dL)	2	1.00
Total Leucocyte count (TLC)	Normal (4000-11000/mm ³)	159	79.50
	Raised (> 11000/mm ³)	31	15.50
	Reduced (< 4000/ mm ³)	10	5.00
Platelet	Normal (> 1.5 lac mL)	153	76.50
	Reduced (<1.5 lac mL)	47	23.50
Serum bilirubin	Normal (0.1-1.2 mg/dL)	166	83.00
	Raised (> 1.2 mg/dL)	34	17.00
Transaminases	Normal (30-50 IU/L)	188	94.00
	Raised (> 50 IU/L)	12	6.00
Urea	Normal (5-20 mg/dL)	162	81.00
	Raised (> 20mg/dL)	38	19.00
Serum Creatinine	Normal (0.6-1.2 mg/dL)	162	81.00
	Raised (> 1.2 mg/dL)	38	19.00

group, and so on. The majority of patients were male (56.5%). Of all the patients, 159 (79.5%) were living in rural areas. According to their occupational history, the highest number of cases, 84 (42%), were farmers, followed by 83 (41.5%) who were laborers, and 33 (16.5%) who were students. (Table 1)

The highest number of scrub typhus cases occurred in September (65 cases), followed by August (53 cases), July (28 cases), and October

(26 cases) (Fig. 1).

The most common presenting complaint among scrub typhus patients was fever (81%), followed by nausea (37.5%), generalized weakness (34%), abdominal pain and eschar (21.5%), breathlessness and cough (in 21% each), headache (19%), and altered sensorium (4.5%) (Fig. 2).

Laboratory profile of scrub typhus patients has shown that Hb was normal among 99%

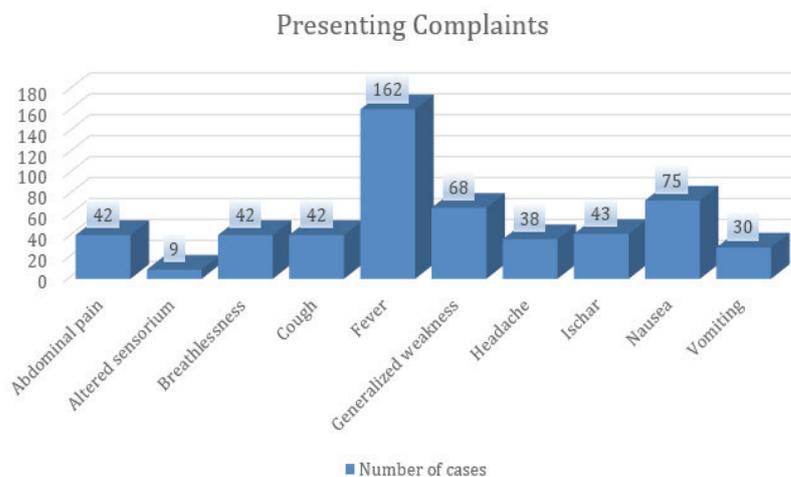


Fig. 2 Presenting Complaints in Cases with Scrub Typhus

Table 3 Complications Seen in Patients With Scrub Typhus

Complications	Number of cases	Percentage
AKI	5	2.50
Scrub encephalitis with septicemia with AKI	7	3.50
Septicemia	4	2.00
Scrub encephalitis with ARDS with AKI with septicemia with septic shock	2	1.00
Septicemia with thrombocytopenia	17	8.50
Septicemia with thrombocytopenia with AKI	6	3.00
Thrombocytopenia	6	3.00
Thrombocytopenia with AKI	6	3.00
Death	2	1.00
No complications	145	2.50

of patients, total leucocyte count was raised in 15.5% of patients, platelets were reduced among 23.5% of patients, serum bilirubin was raised in 17% of patients, transaminase levels were raised among 6% of patients, urea, and serum creatinine were raised among 19% of patients each. (Table 2)

In the present study, the majority of patients, specifically 145 (72.5%), did not experience any complications. However, 55 (27.5%) patients developed multiorgan dysfunction syndrome (MODS) as a complication. Among the cases of scrub typhus, the most common complication was septicemia with thrombocytopenia, affecting 9.5% of the patients. This was followed by scrub encephalitis with septicemia with acute kidney injury (AKI) at 3.5%. Other complications included septicemia with thrombocytopenia with AKI, thrombocytopenia, and thrombocytopenia with AKI, each occurring in 3% of the patients. Additionally, acute kidney injury occurred in 2.5% of the patients, septicemia in 2%, scrub encephalitis with acute respiratory distress syndrome (ARDS) with AKI with septicemia and septic shock, and death, each affecting 1% of the patients (Table 3).

Discussion

In this cross-sectional study, all 200 cases of scrub typhus were analyzed, resulting in a response rate of 100%. The majority of the patients (21.5%) belonged to the age group of 31–40 years, followed by 18.5% from 21–30 years, 14.5% from 41–50 years, and so on. There was a higher proportion of males

(56.5%). Most of the patients (79.5%) were residents of rural areas. Individuals between the ages of 21–40 years, who are more likely to work and sleep in farms, are at a higher risk of getting bitten by infected chiggers. Occupational history revealed that the majority of cases (42%) were farmers, followed by 41.5% who were laborers and 16.5% who were students. The highest number of cases occurred in September, followed by August. A similar study conducted by Narlawar *et al.*¹² also found that the majority of cases (77.5%) were from rural areas, with a peak occurrence in September.

The most common presenting complaint among scrub typhus patients was fever (81%), followed by nausea (37.5%), generalized weakness (34%), abdominal pain, eschar (21.5%), breathlessness, and cough (21% each), headache (19%), vomiting (15%), and altered sensorium (4.5%). Similar findings were reported by Takhar *et al.*¹³ who found that fever was the most common symptom (100%), followed by breathlessness (66.7%), hemoptysis (63.6%), oliguria (51.5%), altered mental status (39.4%), eschar (12%), and lymphadenopathy (18%). Varghese *et al.* also noted that fever was the most common presenting symptom, followed by other symptoms such as nausea, vomiting, breathlessness, cough, altered sensorium, and eschar. Similar presenting complaints in cases of scrub typhus were also reported by authors such as Narvencar *et al.*¹⁴ and Kumar *et al.*¹⁵

In terms of laboratory profile, Hb levels were normal among 99% of patients suffering from scrub typhus, total leukocyte count was

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raised in 15.5%, platelets were reduced in 23.5%, serum bilirubin levels were raised in 17%, transaminase levels were raised in 6%, and urea and serum creatinine levels were raised in 19% each. This is in line with Varghese,¹⁶ who reported that elevated transaminase levels (87%), thrombocytopenia (79%), and leukocytosis (46%) were common laboratory findings. Kamath *et al.*¹⁷ noted that common laboratory abnormalities included leukocytosis (34.3%), thrombocytopenia (68.8%), and transaminitis (87.5%).

Fortunately, the majority of patients (72.5%) in our study did not experience any complications, while 27.5% developed MODS as a complication. The most common complication among scrub typhus cases was septicemia with thrombocytopenia (9.5%), followed by scrub encephalitis with septicemia with acute kidney injury (AKI) (3.5%), septicemia with thrombocytopenia with AKI, thrombocytopenia, and thrombocytopenia with AKI in 3% each, acute kidney injury in 2.5%, septicemia in 2%, scrub encephalitis with ARDS with AKI with septicemia, and septic

shock and death in 1% each. Bhattacharya *et al.*¹⁸ conducted a study to explore the clinical profile and determinants of scrub typhus and found that out of 78 patients with scrub typhus, 38 (48.71%) presented with sepsis. It was observed that the mean age in the sepsis group was significantly lower than in the non-sepsis group. The mortality rate was markedly higher in the sepsis group at 71.05%, compared to none in the non-sepsis group. Regression analysis showed that eschar, Acute Respiratory Distress Syndrome (ARDS), and a Glasgow Coma Scale (GCS) <10 was predictive of increased mortality in patients with scrub typhus and sepsis. Similar complications of scrub typhus were also reported by authors such as Li *et al.*¹⁹ and Jamil *et al.*²⁰

Scrub typhus is one of the important causes of febrile illness in the Vidarbha region of Maharashtra. It can present with diverse clinical manifestations, with or without an eschar. Early diagnosis and appropriate intervention would help in reducing the complications and case fatality associated with the disease.

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