

# A study on the prevalence of scrub typhus among pediatric population in a rural tertiary care hospital in West Bengal



Anirban Bhaduri<sup>1</sup>, Sayani Bose<sup>2</sup>, Atindra Kumar<sup>3</sup>

<sup>1</sup>Associate Professor, <sup>2,3</sup>Senior Resident, Department of Microbiology, Tamralipto Government Medical College and Hospital, West Bengal, India

Submission: 30-07-2024

Revision: 29-09-2024

Publication: 01-11-2024

## ABSTRACT

**Background:** Scrub typhus is a common rickettsial infection endemic in India and is an important cause of acute febrile illness among children. Clinical manifestations vary from mild-to-severe affecting almost all organ systems with a high fatality rate. To reduce morbidity and mortality, a high index of suspicion, timely diagnosis, and treatment are crucial. However, due to lack of awareness, low index of suspicion among clinicians, and non-specific clinical presentation which overlaps with other tropical endemic infections of India such as dengue, chikungunya, malaria, and leptospirosis, scrub typhus is often underdiagnosed in our country. **Aims and Objectives:** (1) To find the prevalence of scrub typhus among children presenting with fever for the last 5 days, (2) To study their clinico-demographic profiles. **Materials and Methods:** Blood collected from children aged 1 month to 12 years of age presenting with fever for the last 5 days were tested for scrub typhus immunoglobulin M enzyme-linked immunosorbent assay. Clinical characteristics and laboratory parameters of the patients were collected. The results obtained were analyzed and interpreted. **Results:** Out of 865 pediatric patients presenting with fever, only 227 (26.24%) were positive for scrub typhus. Maximum cases (45.37%) were found in the age group >5–12 years. Fever was the presenting feature in all the cases. Other common presentations were hepatosplenomegaly, lymphadenopathy, pain abdomen, rash, and eschar. **Conclusion:** Although scrub typhus is an easily treatable disease, timely diagnosis and treatment are needed to avoid complications which require a high degree of suspicion among clinicians along with a robust laboratory setup with adequate diagnostic facilities.

**Key words:** Scrub typhus; Rickettsia; Immunoglobulin M enzyme-linked immunosorbent assay

## INTRODUCTION

Scrub typhus, caused by *Orientia tsutsugamushi* and spread by the bite of trombiculid mites, is a very commonly reported rickettsial infection in India.<sup>1,2</sup> It is a zoonotic disease which is endemic to our country due to its location in the Tsutsugamushi triangle<sup>3</sup> and is often acquired during exposure to crop fields which are an important reservoir for transmission.<sup>4</sup>

It is an important cause of acute febrile illness among children in South Asia including India and is also one of the

re-emerging infections in the Asia Pacific region.<sup>2</sup> Clinical spectrum can vary from mild to severe affecting almost all organ systems and with a high fatality rate.<sup>1,4</sup> Acute fever is the most common manifestation accompanied by headache, myalgia, cough, maculopapular rash, hepatosplenomegaly, generalized edema, generalized lymphadenopathy, nausea, vomiting, and abdominal pain.<sup>2-4</sup> Eschar is a characteristic dark skin lesion which might be observed in patients of scrub typhus but its detection is challenging, particularly in dark-skinned individuals and certain locations such as groins and axilla.<sup>5</sup> Severe complications may include hepatitis, encephalitis, interstitial pneumonia and acute

### Access this article online

#### Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v15i11.68939

E-ISSN: 2091-0576

P-ISSN: 2467-9100

Copyright (c) 2024 Asian Journal of Medical Sciences



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

### Address for Correspondence:

Dr. Sayani Bose, Senior Resident, Department of Microbiology, Tamralipto Government Medical College and Hospital, West Bengal, India.  
Mobile: +91-8961721568. E-mail: sayani7bose@gmail.com

respiratory distress syndrome, septic shock, multiorgan failure, and death.<sup>3,4,6</sup> Mortality rates for untreated patients can reach as high as 30–35%.<sup>6</sup>

To avoid the risk of dangerous complications and to reduce morbidity and mortality, a high index of suspicion, timely diagnosis, and early treatment with antibiotics are crucial.<sup>1,3</sup> However, due to its non-specific clinical presentation which often overlaps with other tropical infections endemic to India such as dengue, chikungunya, malaria, and leptospirosis<sup>7</sup> and low index of suspicion among clinicians, lack of awareness and limited access to specific and sensitive diagnostic tests in the community, scrub typhus is often underdiagnosed in our country.<sup>4,8</sup> A late presentation along with a delay in diagnosis and treatment causes an overall 11.1% of deaths in children under 10 years of age.<sup>9</sup>

Since there is limited data available regarding scrub typhus among the pediatric age group in the district of East Midnapore of West Bengal, this study was conducted on the seroprevalence, demography, clinical presentation, laboratory features, and complications of scrub typhus in children presenting with acute fever in a tertiary care hospital.

**Aims and objectives**

1. To find the prevalence of scrub typhus among children presenting with fever for last 5 days.
2. To study their clinco-demographic profiles.

**MATERIALS AND METHODS**

This is a hospital-based retrospective data-based cross-sectional observational study which was conducted at Tamralipto Government Medical College and Hospital, Tamluk, East Medinipur, West Bengal, India. The study period was from January 2022 to December 2023.

All children 1 month to 12 years of age presenting with fever for at least 5 days either attending the outpatient department (OPD) or admitted to the department of pediatrics in the general ward as well as the pediatric intensive care unit (ICU) were included in the study.

Blood collected from children presenting with fever for the last 5 days was tested for scrub typhus immunoglobulin M (IgM) enzyme-linked immunosorbent assay using the INBIOS kit. Optical density value >0.5 was considered positive for scrub typhus diagnosis.

A pre-designed pro forma was used for validating the clinical features and laboratory parameters. Laboratory tests such as complete blood count, C-reactive protein (CRP), liver function test (LFT), serum urea (Ur), creatinine (Cr), and prothrombin time (PT) were done. Hepatic

dysfunction was defined as serum bilirubin >1 mg/dL, serum aspartate aminotransferase (AST) >80 U/L, serum alanine aminotransferase (ALT) >80 U/L, serum albumin <3 g/dL and PT ≥15 s.

The results obtained were analyzed and interpreted.

**RESULTS**

Out of 865 pediatric patients presenting with acute fever, only 227 (26.24%) tested positive for scrub typhus IgM (Table 1), out of which 125 (55.07%) were males and 102 (44.93%) were females (Table 2).

Among all the scrub typhus-positive patients, maximum cases of 103 (45.37%) belonged to the age group >5–12 years, followed by 69 cases (30.4%) >2–5 years, 33 cases (14.54%) in 13 months to 2 years whereas least cases were seen among infants >1 year that is 22 (9.69%) (Figure 1).

Scrub typhus reactive cases were seen more or less throughout the year with an upsurge of cases during monsoon and post-monsoon periods and the least number of cases during winter (Figure 2).

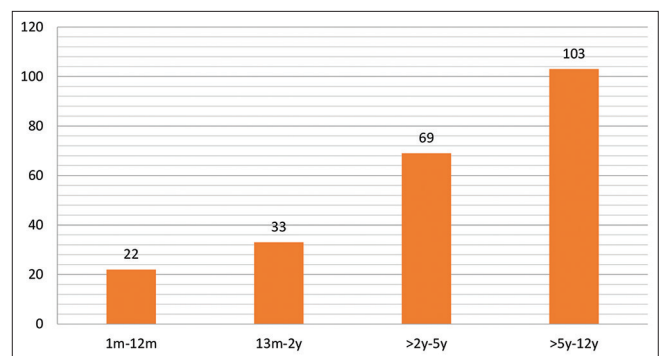
**Table 1: Prevalence of scrub typhus**

IgM ELISA result	Frequency	Percentage
Scrub typhus positive	227	26.24
Scrub typhus negative	638	73.76
Total	865	100

**Table 2: Gender-wise distribution of scrub typhus IgM-positive cases**

Gender	Frequency	Percentage
Male	125	55.07
Female	102	44.93
Total	227	100

IgM: Immunoglobulin M



**Figure 1: Age-wise distribution of scrub typhus immunoglobulin M-positive cases**

Fever was seen to be present in all the patients diagnosed to have scrub typhus IgM-positive. Associated non-specific symptoms such as headache, myalgia, lymphadenopathy, vomiting, pain abdomen, and cough were commonly observed. Hepatomegaly and splenomegaly were also common examination findings in our study. Rash and eschar were seen in approximately 20% of cases, whereas very few cases presented with severe symptoms such as seizure and altered sensorium which had to be managed in ICU (Table 3).

Among the laboratory parameters, raised AST levels were most frequently observed followed by increased total leucocyte count. Notably significant rise in CRP level (>100) was seen only in 6% of cases (Table 4).

Out of 227 scrub typhus IgM-positive cases, 28.19% of patients were given OPD-based treatment, 69.60% of patients were treated at the hospital ward, and 2.20% of patients required admission in the ICU (Figure 3).

## DISCUSSION

Scrub typhus is one of the most commonly overlooked re-emerging infectious zoonotic diseases which causes

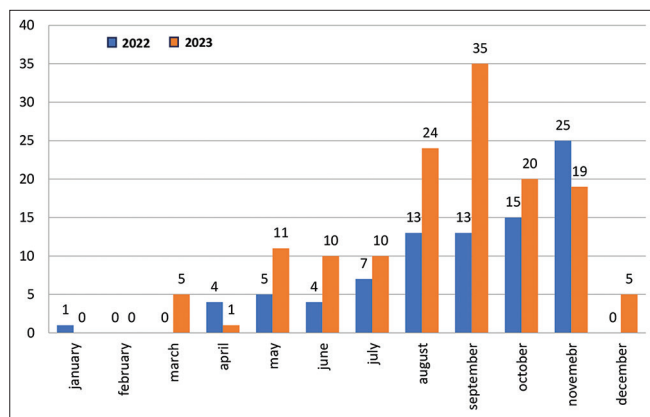


Figure 2: Seasonal distribution of scrub typhus cases

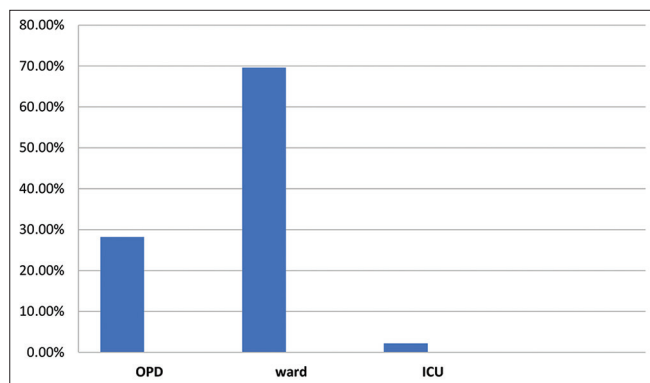


Figure 3: Treatment facility available by scrub typhus-positive cases

undifferentiated acute febrile illness.<sup>3,4</sup> Many children present to our hospital with fever for 5 days or longer and non-specific signs and symptoms. The district of East Midnapur in the south-west part of West Bengal has observed a high incidence of scrub typhus over the last few years. In this study, the prevalence of scrub typhus among all the children presenting with fever >5 days was found to be 26.24%.

A slight male preponderance was observed (males 55.07% and females 44.93%) among the scrub IgM-positive cases which has also been observed in previous studies.<sup>1,10,11</sup>

Most of the scrub cases were seen in children between the age of 5 and 12 years (30.40%) which is similar to the study by Jana et al.,<sup>3</sup> followed by children between 2 and 5 years (30.40%), followed by toddlers between 13 months and 2 years age (14.54%) whereas least cases were seen in infants (9.69%). The youngest case of scrub typhus in our study was observed in a 3-month-old infant.

Table 3: Clinical features observed among the scrub typhus-positive cases

Clinical features	Number (n=227)	Percentage
Fever	227	100
Headache	45	19.82
Myalgia	34	15
Lymphadenopathy	80	35.24
Vomiting	63	27.75
Pain abdomen	53	23.35
Cough	56	24.67
Rash	48	21.15
Eschar	45	19.82
Icterus	14	6.17
Edema	34	14.98
Hepatomegaly	98	43.17
Splenomegaly	77	33.92
Seizure	12	5.29
Altered sensorium	17	7.50

Table 4: Laboratory parameters of scrub typhus-positive cases

Deranged laboratory parameters	Number (n=227)	Percentage
Hemoglobin <10 g/dL	64	28.19
Total leucocyte count >11,000/uL	114	50.22
Platelet count <1.5 lakh/uL	57	25.11
CRP >6	221	97.36
CRP >50	40	39.65
CRP >100	14	6.17
Urea >30 mg/dL	5	2.20
Creatinine >1.5 mg/dL	7	3.08
Total serum bilirubin >1 g/dL	14	6.17
ALT >80 IU/L	68	29.96
AST >80 IU/L	154	67.84
Albumin <3 g/dL	18	7.94
Prothrombin time >15 s	6	2.64

CRP: C-reactive protein, ALT: Alanine aminotransferase, AST: Aspartate aminotransferase

On analyzing the month-wise distribution of scrub typhus cases a seasonal upsurge of cases was identified during monsoon and post-monsoon periods and the least number of cases during winter. The correlation between the occurrence of scrub typhus cases with monsoon and post-monsoon season is clearly evident in our study which can be explained by the fact that there is increased exposure to vector trombiculid mites during harvesting season and also due to the growth of new vegetation, serving as habitat for the vector.<sup>12</sup>

Fever was the most common presenting feature in all the cases which is an identical finding to previous other studies.<sup>1,3,13</sup> Some other common clinical features observed among the scrub patients in our study were cough, headache, lymphadenopathy, vomiting, pain abdomen, rash, and eschar. Rash (21.15%) and eschar (19.82%) in our study were found to be close to a few studies<sup>3,14</sup> but were significantly less compared to some other studies.<sup>1,9,15</sup> Although eschar is a pathognomonic finding of scrub typhus, in our study, it was not found to be pathognomonic among children. Edema, icterus, seizure, and altered sensorium were some of the less commonly observed presenting features in our study. Very few cases of seizure (5.29%) and altered sensorium (7.50%) were observed in our study which is a similar finding in another study by Shajahan and Sahana<sup>6</sup> but other studies<sup>15</sup> have shown a significantly higher percentage of these findings. Hepatomegaly (43.17%) and splenomegaly (33.92%) were common examination findings in our study.

On investigation, anemia was seen in 28.29% of the patients which is very close to the finding in a study in Orissa.<sup>4</sup> Leukocytosis was observed in 50.22% of patients, and thrombocytopenia was found in 25.11% of the patients which is also a similar observation in other studies.<sup>1,16,17</sup> We observed that CRP was elevated (>6 mg/L) in most of the patients (97.36%), very high CRP (>50 mg/L) was found in 40% of patients, and extremely high CRP in 6.17% of the patients.

The most common abnormality in LFT was an elevation in AST (67.84% of cases) and ALT (29.96% of cases) which has also been observed in several other studies.<sup>1,3,18</sup> Total serum bilirubin was elevated among 3.96% of the patients which is similar to what was found in a study by Jana et al.<sup>3</sup> In our study, hypoalbuminemia was only in 7.94% of the patients which is significantly less than what was found in several other studies.<sup>2,6,10,16,19</sup> Coagulopathy (PT>15 s) in our study was observed in 2.64% of cases, similar to other studies in Eastern India.<sup>1,3</sup>

As per renal function tests are concerned, Ur and Cr levels were elevated in only 2.20% and 3.08% of cases,

respectively; however, other studies have shown a higher percentage of patients with elevated Ur and Cr levels.<sup>4,6,18</sup>

While it was possible for some patients (28.19%) to be treated at OPD, most of the patients (69.60%) required admission to the general ward of the hospital and very few cases (2.20%) even required treatment at the ICU.

#### Limitations of the study

This study has been conducted in a resource limited setting with the available diagnostic facilities.

Molecular studies, if done, can give a better picture in a upgraded diagnostic facility.

## CONCLUSION

Scrub typhus is an endemic zoonotic infection with a wide range of non-specific clinical presentation and complications which can often overlap with other endemic tropical diseases found in our country. Although it is an easily treatable disease with easily available low-priced antibiotics, timely diagnosis and treatment are very much needed to avoid complications which will require a high degree of suspicion among clinicians along with a robust laboratory set up with adequate diagnostic facilities.

## ACKNOWLEDGMENT

We acknowledge sincerely to all the staffs of the Department of Microbiology, at Tamralipto Government Medical College and Hospital, Tamruk, East Medinipur, West Bengal, India, and all the participants included in this study.

## REFERENCES

1. Agrawal A, Parida P, Rup AR, Patnaik S and Biswal S. Scrub typhus in paediatric age group at a tertiary care centre of Eastern India: Clinical, biochemical profile and complications. *J Family Med Prim Care*. 2022;11(6):2503-2506. [https://doi.org/10.4103/jfmpc.jfmpc\\_1464\\_21](https://doi.org/10.4103/jfmpc.jfmpc_1464_21)
2. Mukhopadhyay, Gupta R, Shukla S, Patnaik S and Biswal S. Once forgotten now re-emerging: scrub typhus infection in pediatric patients from North West India. *Cureus*. 2023;15(8):e44044. <https://doi.org/10.7759/cureus.44044>
3. Kumar Jana J, Krishna Mandal A, Gayen S, Mahata D and Alam Mallick MS. Scrub typhus in children: A prospective observational study in a tertiary care hospital in Eastern India. *Cureus*. 2023;15(7):e41976. <https://doi.org/10.7759/cureus.41976>
4. Kumar BR, Anupriya A, Uma A and Prabhakaran N. Small bites-big threats: Prevalence of scrub typhus among the pediatric population in a rural tertiary care hospital in South India. *Trop J Pathol Microbiol*. 2020;6(4):292-297.



5. Krishnan U, Prasanna D, Sudha K, Vasumathi A, Sridevi and Thilagavathi N. Prevalence and clinico-epidemiological profile of scrub typhus in paediatric patients presenting with acute undifferentiated febrile illness in a tertiary care centre. *Int J Acad Med Pharm.* 2024;6(2):356-360.  
<https://doi.org/10.47009/jamp.2024.6.2.74>
6. Shajahan N and Sahana KS. Clinical profile of scrub typhus in children at a tertiary care hospital in South India. *Karnataka Pediatr J.* 2022;37(2):46-50.  
[https://doi.org/10.25259/KPJ\\_14\\_2022](https://doi.org/10.25259/KPJ_14_2022)
7. Damodar T, Singh B, Prabhu N, Marate S, Gowda VK, Lalitha A, et al. Association of scrub typhus in children with acute encephalitis syndrome and meningoencephalitis, Southern India. *Emerg Infect Dis.* 2023;29(4):711-722.  
<https://doi.org/10.3201/eid2904.221157>
8. Panigrahi A, Narasimham MV, Biswal M, Bisht K, Mishra B and Parida B. Epidemiology of scrub typhus in a tertiary care hospital of Southern Odisha: A cross sectional study. *Indian J Med Microbiol.* 2023;42:92-96.  
<https://doi.org/10.1016/j.ijmmb.2022.09.005>
9. Majhi B, Rao BM, Rath SS and Barma SK. Prevalence of scrub typhus in children among acute fever in a tertiary care hospital. *Panacea J Med Sci.* 2021;11(3):565-568.
10. Sarangi R, Pradhan S, Debata NC and Mahapatra S. Clinical profile of scrub typhus in children treated in a tertiary care hospital in Eastern India. *Pediatr Pol.* 2016;91(4):308-311.  
<https://doi.org/10.1016/j.pepo.2016.04.005>
11. Das P, Singh D, Das M, Nayak R and Mohakud N. Epidemiological and clinical features of scrub typhus in Odisha, Eastern India. *Med J Dr Patil Vidyapeeth.* 2019;12(5):419.  
[https://doi.org/10.4103/mjdrdypu.mjdrdypu\\_236\\_18](https://doi.org/10.4103/mjdrdypu.mjdrdypu_236_18)
12. Varghese GM, Raj D, Francis MR, Sarkar R, Trowbridge P and Muliyl J. Epidemiology and risk factors of scrub typhus in south India. *Indian J Med Res.* 2016;144(1):76-81.  
<https://doi.org/10.4103/0971-5916.193292>
13. Pathak S, Chaudhary N, Dhakal P, Shakya D, Dhungel P, Neupane G, et al. Clinical profile, complications and outcome of scrub typhus in children: A hospital based observational study in Central Nepal. *PLoS One.* 2019;14:e0220905.
14. Bal M, Mohanta MP, Sahu S, Dwibedi B, Pati S and Ranjit M. Profile of pediatric scrub typhus in Odisha, India. *Indian Pediatr.* 2019;56(4):304-306.
15. Panda A, Kishore SV, Pradhan M and Champatiray J. Clinical profile and outcome of scrub typhus in children in Odisha. *J Clin Diagn Res.* 2021;15(7):SC01-SC04.  
<https://doi.org/10.7860/JCDR/2021/47443.15080>
16. Dass R, Deka NM, Duwara SG, Barman H, Hoque R, Mili D, et al. Characteristics of pediatric scrub typhus during an outbreak in the North Eastern region of India: Peculiarities in clinical presentation, laboratory findings and complications. *Indian J Pediatr.* 2011;78(11):1365-1370.
17. Deepa R, Vasumathi A, Vasanthi S and Aravind M. Seroprevalence and clinical profile of scrub typhus in children in a rural tertiary care hospital, Tamil Nadu, India. *Natl J Lab Med.* 2021;10(2):MO01-MO05.
18. Kumar M, Krishnamurthy S, Delhikumar CG, Narayanan P, Biswal N and Srinivasan S. Scrub typhus in children at a tertiary hospital in southern India: Clinical profile and complications. *J Infect Public Health.* 2012;5(1):82-88.  
<https://doi.org/10.1016/j.jiph.2011.11.001>
19. Wangrangsimakul T, Greer RC, Chanta C, Nedsuwan S, Blacksell SD, Day NP, et al. Clinical characteristics and outcome of children hospitalized with scrub typhus in an area of endemicity. *J Pediatric Infect Dis Soc.* 2020;9(2):202-209.  
<https://doi.org/10.1093/jpids/piz014>

**Authors Contributions:**

**AB-** Concept analysis and writing; **SB-** Result analysis and overall guidance in the article; **AK-** Writing of discussions.

**Work attributed to:**

Department of Microbiology, Tamralipto Government Medical College and Hospital, West Bengal, India.

**Orcid ID:**

Dr. Anirban Bhaduri - <https://orcid.org/0000-0001-6131-4597>

Dr. Sayani Bose - <https://orcid.org/0009-0006-3578-4732>

Dr. Atindra Kumar - <https://orcid.org/0009-0005-9530-6161>

**Source of Support:** Nil, **Conflicts of Interest:** None declared.