

# Typical and Atypical Manifestation of Scrub Typhus in Children

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**Abstract:** **Background:** Scrub typhus is grossly under-diagnosed or lately diagnosed in India because of its non-specific clinical presentation, a limited awareness about the disease, a low index of suspicion among clinicians, and a lack of diagnostic facilities. Absence of typical features may create diagnostic dilemma among physicians, which may lead to complications & high mortality. **Objective:** 1. To assess the clinical profile, complication and outcome of scrub typhus in children. 2. To correlate the severity of clinical presentation with duration of symptoms & laboratory evidence of infection. **Methods:** A hospital based Cross sectional study which was conducted in the Department of Paediatrics, And Department of Microbiology, VIMSAR, BURLA Odisha from August 2023 to January 2024. Children from 1 month to 14 years of age presenting with fever in whom rickettsia infection is suspected included. All children who are found to be Elisa or IgM positive for scrub typhus even if admitted for other disease included. **Result:** Out of 254 clinical samples male child are the most affected. The total leukocyte count was elevated in 30.6% of the cases. An elevated serum creatinine level or a change in the serum creatinine level greater than 0.3 mg/dl, which is a diagnostic of AKI, was observed in 28% of cases. **Conclusion:** Pediatric scrub typhus is a common infection and should be suspected in cases with fever for more than 5 days and non-specific signs and symptoms. Early detection and timely management lead to a higher recovery rate.

**Keywords:** Scrub typhus, Rickettsia, Lymphadenopathy, Eschar, Hepatosplenomegaly, pallor

## 1. Introduction

Fever is the most common presentation for which parents of a child seek medical advice. Among various causes of fever, infection is the most common cause of fever in children. Out of all infections, recently scrub typhus has emerged as an important differential diagnosis of acute febrile illness. In South East Asia, this mite borne illness is an emerging febrile illness transmitted from rodents to humans. The causative organism is distinct from, but related to Rickettsia species. *Orientia tsutsugamushi*, is the most commonly reported rickettsia infection on the Indian subcontinent. This disease has emerged as a modern epidemic.

Scrub typhus is grossly under-diagnosed or lately diagnosed in India because of its non-specific clinical presentation, a limited awareness about the disease, a low index of suspicion among clinicians, and a lack of diagnostic facilities. (2) Absence of typical features may create diagnostic dilemma among physicians thereby delaying the diagnosis which may lead to complications & high mortality. Presentations may range from mild to severe illness ie ARDS, DIC, AKI and/ or MODS. A late presentation & delay in diagnosis may increase mortality to 11 %.

## 2. Material and Method

A hospital based Cross sectional study which was conducted in the Department of Paediatrics, VIMSAR, BURLA, Odisha from AUGUST 2023 to JANUARY 2024.

### Inclusion criteria:

- 1) Children from 1 month to 14 years of age presenting with fever in whom rickettsia infection is suspected.

- 2) All children who are found to be Elisa or IgM positive for scrub typhus even if admitted for other disease.

### Exclusion criteria

- 1) Those who opted out of the study in between due to some or other reason.

### Method

The demographic characteristics of the patient, history and clinical examination findings were documented in a structured case recording format by the co-investigator and trained doctors. All fever cases with rash /oedema/ pallor/ icterus/ lymphadenopathy/ hepatosplenomegaly and or any other systemic features with or without eschar was included. Consent was recorded from parents and or child if more than 12 years. Those opting to quit after enrolled into study was excluded. All cases were subjected to investigations like CBC, CPS, QCRP, LFT, RFT, Albumin, urinalysis and serum electrolyte estimation, IgM scrub (Kit testing) and / or ELISA. Fundus examination, CSF examination, x-ray chest, ECG, ECH, MRI was done if clinical condition warrants.

### Statistical Analysis

The data was entered in Microsoft office excel and analysis was done by appropriate statistical tool.

### Ethical Approval

Taken from Institutional Ethics Committee (IEC) of Pandit Raghunath Murmu Medical College and Hospital (VIMSAR), Burla, Odisha, India in 6<sup>th</sup> IEC meeting before starting the study.

**Funding**

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**Conflict of Interest**

None declared.

**3. Results****Table 1: Distribution of Gender**

Gender	Frequency	Percent
Male	148	58.3
Female	106	41.7
Total	254	100.0

**Table 2: Distribution of Symptoms**

Symptoms	No. (%)
Fever	254(100)
Vomiting	45 (17.7)
Cough	42 (16.5)
Headache	138 (54.3)
Chill_rigor	164 (64.6)
Pallor	55 (21.6)

**Table 3: Distribution of Signs**

Signs	No. (%)
Eschar	13 (20)
Rash	16 (15.8)
Lymphadenopathy	63 (62.4)
Hepatomegaly	83 (82.2)
Splenomegaly	37 (36.6)
Edema	31 (30.4)
Ascites	10 (15)

**Table 4: Distribution of Lab investigation**

Parameters	No.	%		No.	%
↑Creatinine	8	7.9	TLC (per mm <sup>3</sup> )		
Hypoalbuminemia	21	20.7	<4000	9	8.9
↑AST/ALT	13	12.8	4000—11000	61	60.3
	12	11.8	>11000	31	30.6
↑Alkaline phosphatase	4	3.9	Platelets		
Hyponatremia	7	6.9	>150,000	17	16.8
↑CPK (MB)	9	8.9	100,000—150,000	61	60.3
			<100,000	23	22.7

The laboratory parameters of the cases are shown in Table 4. The total leukocyte count was elevated in 30.6% of the cases. An elevated serum creatinine level or a change in the serum creatinine level greater than 0.3 mg/dl, which is a diagnostic of AKI, was observed in 20% of cases. Hyponatremia was found in 6.9% of the cases. The serum CPK level (total and MB fraction) was elevated in 8.9% of cases.

**4. Discussion**

The rickettsial agent *Orientia tsutsugamushi* is the cause of scrub typhus, an acute febrile illness. The disease is spread to people via the bite of an infected chigger, which is a trombiculid mite larva [4]. The bacteria proliferate at the site of the inoculation, causing the development of a papule that ulcerates, turns necrotic, transforms into an eschar, and

results in regional lymphadenopathy that may quickly advance to global lymphadenopathy. Scrub typhus' primary pathogenic mechanism is vasculitis. Skin rash, microvascular leakage, edoema, tissue hypo-perfusion, and end organ ischemic injury are all caused by it [5].

In our study pediatric scrub typhus at a tertiary care hospital Male to female ratio was 1.44:1, which is probably because males are more likely to be exposed to chiggers because they enjoy playing outside more than girls do [6]. 8.8 years was the average age at presentation, which is comparable to other authors' reports [7]. The majority of cases happened between September and November, which comes after the monsoon rainy season and falls during the height of vegetation growth and mite population. Other investigators have made similar observations [8] while research from Taiwan discovered the highest number of cases between May and August [9].

In the current investigation, convulsion (23.8%) and other typical symptoms were also seen. These symptoms were reported in 49%, 51%, 34%, 13%, and 11% of participants in a study from south India [10]. In Taiwan, Huang et al. reported that 29% of cases involved vomiting and 50% involved cough [11]. While previous publications have reported hepatomegaly in 59% to 98% of cases and splenomegaly in 18% to 88% of cases, respectively, we detected hepatomegaly and splenomegaly in 82% and 59% of cases, respectively [12].

Splenomegaly is a crucial indicator for separating scrub typhus from dengue fever because it is infrequent in the latter. In the current study, 38% of patients reported tender lymphadenopathy. Without noting soreness, some writers have found lymphadenopathy in 18% to 62% of cases [13]. The main laboratory finding in the current investigation was thrombocytopenia, which was found in 53% of participants and has been reported to occur between 22% and 78% of the time in the literature [14]. Although thrombocytopenia was a significant result, it wasn't linked to an elevated hematocrit, a crucial indicator for distinguishing scrub typhus from dengue fever.

For youngsters, scrub typhus is a condition that poses a serious risk of death. Scrub typhus can have serious side effects, including ARDS, pneumonia, meningo-encephalitis, AKI, myocarditis, severe thrombocytopenia, and bleeding, which typically appear in the second week of sickness. In the current study, meningoencephalitis was the most frequent complication seen in 30.3% of cases, whereas other studies have documented it in 5% to 19% [15].

In comparison to the 45% reported in a prior study [16], hypotension needing inotropic support (shock) was detected in 25.8% of cases. AKI was another typical complication that was discovered in 16.7% of cases. AKI has frequently been misdiagnosed as being caused by rickettsial infections, especially in youngsters. In children with rickettsial infections, no cases of AKI were reported in a recent retrospective investigation from central India [17]. three earlier investigations using paediatric scrub typhus compared to another study from south India, which revealed a greater frequency of 20% [18]. However, several studies have indicated lower occurrences of AKI ranging from 2 to 10%

[19]. AKI has been reported in 12–22% of adult studies [20]. A direct invasion by *Orientia tsutsugamushi* results in acute tubular necrosis, which results in AKI [21].

In the current study, pneumonia was found in 10.6% of cases, whereas other studies have found pneumonia in between 3% and 21% of cases [22]. In the current study, myocarditis and ARDS were recorded in 12% and 9% of cases, respectively. Research from southern India found that myocarditis occurs often (34%) [23]. 4% to 22% of instances of ARDS have been described in the literature [24]. In the current study, 12 percent of children experienced respiratory failure and required assisted breathing, compared to 35 percent in a study from south India [25].

As in other studies [26], the majority of the patients in our study had a spectacular clinical response to doxycycline or chloramphenicol. Additionally, a diagnostic test has been conducted using this severe reaction [27].

## 5. Conclusion

Scrub typhus should be considered as a differential in any community acquired undifferentiated febrile illness regardless of the presence of an eschar, and needs empirical therapy along with testing for scrub typhus. Myocarditis and acute kidney injury are important complications which when addressed early can prevent mortality. Use of doxycycline shows a favorable outcome.

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