



CLINICAL AND EPIDEMIOLOGICAL STUDY OF SCRUB TYPHUS

General Medicine

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ABSTRACT

Study Design: This was a prospective observational study conducted over 18 months in a tertiary care hospital in cuddalore, India, involving patients diagnosed with scrub typhus by Elisa testing. A total of 136 cases were enrolled to assess the clinical manifestations, laboratory findings, complications, and outcomes.

Aim And Objective

- To examine the clinical manifestations and systems involved in scrub typhus.
- To correlate clinical features with laboratory parameters, including complete blood count, liver function tests, and renal function tests.
- To identify complications and outcomes in patients with scrub typhus.

Materials And Methods: Patients who tested positive for scrub typhus by Elisa and were admitted to the medicine wards/ICU were included in the study. Demographic details, clinical manifestations, and laboratory data were documented. Statistical analysis was conducted using SPSS version 26.0. **Results:** The study population had a slight female predominance (55.1%), with the majority of participants aged 18-30 years. Fever, headache, and gastrointestinal symptoms were the most common clinical manifestations. Laboratory findings showed thrombocytopenia in 47.1% and elevated liver enzymes in about one-third of patients. Complications included Ards (10.3%) and mods (6.6%), with a mortality rate of 2.2%.

Conclusion: Scrub typhus presented with diverse symptoms, predominantly fever, headache, and gastrointestinal issues. Ards and mods were the most common complications, primarily associated with mortality. This study highlights the clinical burden of scrub typhus in the region and the need for early diagnosis and intervention.

KEYWORDS

Scrub typhus, orientia tsutsugamushi, epidemiology, clinical manifestations, complications, acute respiratory distress syndrome, multi-organ dysfunction syndrome, mortality, India.

INTRODUCTION

Scrub typhus, an acute febrile infectious illness caused by the obligate intracellular gram-negative bacteria *Orientia Tsutsugamushi*, is transmitted by the bite of infected larva (chigger) of the mite *Leptotrombidium deliense* in India. It remains one of the most underdiagnosed diseases globally, often necessitating hospitalization.(1) Recent years have witnessed a surge in scrub typhus cases in India, particularly during the late rainy and early winter seasons.(2) In the Asia-Pacific region, approximately one billion individuals are deemed at risk, with an estimated one million cases occurring annually. Notably, scrub typhus accounts for nearly a quarter of febrile episodes in endemic areas. Severe cases or those with improper treatment may result in mortality rates as high as 30%.(3,4) With a decrease in malaria cases in Odisha, other tropical infectious diseases like dengue, leptospirosis, enteric fever, and scrub typhus are contributing to the burden of Acute Undifferentiated Febrile Illness (AUF). (5) AUF encompasses undiagnosed fevers lasting less than 14 days without a localized source of infection. Scrub typhus has recently emerged in the state and is implicated in febrile illnesses among both pediatric and adult patients.(6,7,8) Diagnosis of scrub typhus is challenging due to its nonspecific clinical manifestations, limited access to specific and sensitive diagnostic tests, and low suspicion among clinicians. However, early treatment is crucial in shortening the disease course and reducing fatalities. This study has been conducted in a tertiary care hospital setting in Cuddalore district with the aim of collecting data related to the epidemiology of scrub typhus and to analyse the clinical manifestations and clinical outcomes of scrub typhus.

AIMS & OBJECTIVES

- To study clinical manifestations and systems involved in scrub typhus patients.
- To correlate the clinical features with laboratory profile like complete blood count, liver function tests and renal function tests.
- To study the complications and clinical outcome in scrub typhus patients.

METHODOLOGY

This was a prospective observational study conducted for a period of 18 months from the date of approval by the ethics committee. Patients admitted in medicine wards/ICU positive for scrub typhus in

Government medical college Hospital, Cuddalore were included in this study.

Inclusion Criteria

Patients admitted in medicine wards/ICU who are tested positive for scrub typhus by ELISA test.

Exclusion Criteria

No exclusion criteria

Sampling Technique

Convenient sampling

**Duration Of Study
Eighteen Months**

The patients who were admitted in the ward and ICU with ELISA positive for scrub typhus were enrolled in this study. Informed written consent was obtained from the study participants chose by convenient sampling technique. Totally 136 patients were included in this study.

Basic demographic details like age, sex, socioeconomic status, residence were documented.

Anthropometric details like height, weight, BMI were recorded.

Symptoms were recorded. Clinical manifestations were noted.

Laboratory investigations included complete blood count, serum urea, creatinine, ELISA test for Scrub typhus, Chest Xray, Urine routine.

The patients' course in the hospital were followed up. The clinical outcome were documented.

All the collected data were entered into master chart excel. Statistical analysis was done using SPSS version 26.0.

OBSERVATION AND RESULTS

Fever

All participants (100%) reported having a fever, indicating that fever is a common symptom among the study population.

		Frequency	Percent
Valid	Yes	136	100.0

Headache

A significant majority of participants (77.2%) reported having a headache, while 22.8% did not. This suggests that headache is a prevalent symptom in the study population.

		Frequency	Percent
Valid	Absent	31	22.8
	Present	105	77.2
	Total	136	100.0

GI Symptoms

Most participants (90.4%) reported gastrointestinal (GI) symptoms, indicating that GI symptoms are highly prevalent among the study population.

		Frequency	Percent
Valid	Absent	13	9.6
	Present	123	90.4
	Total	136	100.0

Dyspnoea

About 19.9% of participants reported dyspnoea, while 80.1% did not. This indicates that dyspnoea is less common among the study population.

		Frequency	Percent
Valid	Absent	109	80.1
	Present	27	19.9
	Total	136	100.0

Lymphadenopathy

Lymphadenopathy is present in 28.7% of participants, with cervical (8.8%), inguinal (17.6%), and axillary (2.2%) locations being the most common. The majority (71.3%) do not have lymphadenopathy.

		Frequency	Percent
Valid	Absent	97	71.3
	Axillary	3	2.2
	Cervical	12	8.8
	Inguinal	24	17.6
	Total	136	100.0

Eschar

Eschar is present in 39.7% of participants, with inguinal (16.9%), trunk (10.3%), and axillary (6.6%) locations being the most common. The majority (60.3%) do not have eschar.

		Frequency	Percent
Valid	Absent	82	60.3
	Axillary	9	6.6
	Inframammary	5	3.7
	Inguinal	23	16.9
	Penile	3	2.2
	Trunk	14	10.3
	Total	136	100.0

Rash

Rash is present in 30.1% of participants, while 69.9% do not have rash. This indicates that rash is relatively less common among the study population.

		Frequency	Percent
Valid	Absent	95	69.9
	Present	41	30.1
	Total	136	100.0

WBC

The majority of participants (62.5%) have WBC counts between 4000-11000. Other categories include WBC counts greater than 11000 (26.5%) and less than 4000 (11.0%).

		Frequency	Percent
Valid	<4000	15	11.0
	>11000	36	26.5
	4000-11000	85	62.5
	Total	136	100.0

Platelet

The majority of participants (52.9%) have platelet counts between 150000-450000. Other significant categories include 50000-150000 (35.3%) and less than 50000 (11.8%).

		Frequency	Percent
Valid	<50000	16	11.8
	150000-450000	72	52.9

		Frequency	Percent
	50000-150000	48	35.3
	Total	136	100.0

SGOT

The majority of participants (59.6%) have SGOT levels less than 150, while 40.4% have SGOT levels greater than or equal to 150. This indicates a moderate prevalence of elevated SGOT levels in the study population.

		Frequency	Percent
Valid	<150	81	59.6
	>=150	55	40.4
	Total	136	100.0

SGPT

The majority of participants (68.4%) have SGPT levels less than 150, while 31.6% have SGPT levels greater than or equal to 150. This suggests that elevated SGPT levels are present in about one-third of the study population.

		Frequency	Percent
Valid	<150	93	68.4
	>=150	43	31.6
	Total	136	100.0

Complications

The majority of participants (70.6%) did not experience any complications. Among those who did, the most common complications were ARDS (10.3%) and MODS (6.6%). Other complications included bleeding (5.1%), pneumonia (5.9%), and encephalitis (1.5%). This distribution indicates that while complications are relatively less common, they are diverse when present.

		Frequency	Percent
Valid	Absent	96	70.6
	ARDS	14	10.3
	Bleeding	7	5.1
	Encephalitis	2	1.5
	MODS	9	6.6
	Pneumonia	8	5.9
	Total	136	100.0

Mortality

The mortality rate in the study population is 2.2%, with 3 out of 136 participants dying. The remaining 97.8% survived. This indicates a low mortality rate among the participants.

		Frequency	Percent
Valid	No	133	97.8
	Yes	3	2.2
	Total	136	100.0

DISCUSSION

Scrub typhus poses a significant public health challenge across the Asia-Pacific region, encompassing countries such as Korea, Japan, China, Taiwan, India, Indonesia, Thailand, Sri Lanka, and the Philippines. Globally, it affects one billion individuals and annually results in illness for one million people.^[30] This disease, also referred to as tsutsugamushi disease, is caused by *Orientia tsutsugamushi*, a gram-negative bacterium transmitted by arthropods and requiring intracellular conditions for survival.

Between 5 to 14 days after being bitten by an infected *Leptotrombidium* mite, individuals typically begin to show signs of scrub typhus infection. These symptoms include non-specific flu-like symptoms, fever, a distinctive rash, and a lesion known as an eschar at the bite site. Headache, muscle pain, cough, swollen lymph nodes, nausea, vomiting, and abdominal pain are also commonly reported.^[31,32,33] Fever and headache are particularly prevalent among patients diagnosed with scrub typhus, with studies noting their presence in 95% to 100% of confirmed cases.^[34,35]

An eschar, a characteristic clinical feature of scrub typhus, develops at the site where the mite has bitten. Initially appearing as a small bump, it progresses to form an ulcer that crusts over and resembles a burn mark from a cigarette. The eschar typically appears before the onset of fever and other symptoms.^[36] The prevalence of eschars varies widely, ranging from 1% to 97% depending on geographical location and study.^[37,38] They are more easily observed on Caucasian and East Asian patients compared to those with darker skin tones in South Asia.^[39] Eschars are most commonly found on the front of the body, particularly within 30 cm below the umbilicus in males. In females, they are more frequently located on the anterior chest, head, and neck.^[39,40] Children

often have eschars in the axillary region as well as the previously mentioned areas.^[41,42]

This prospective observational study spanned 18 months from its approval by the ethics committee. It focused on patients admitted to the medicine wards or ICU at Government Medical College Hospital, Cuddalore, who tested positive for scrub typhus via ELISA test. The study employed convenient sampling, enrolling a total of 136 patients during this period.

The patients' hospital course was monitored, and clinical outcomes were documented. Data collected were entered into a master chart in Excel, and statistical analysis was conducted using SPSS version 26.

All participants (100%) reported having a fever, indicating its ubiquity in the study population. A substantial majority (77.2%) of participants reported experiencing headaches, highlighting its prevalence among the study group.

This is similar to the study by Jamil et al.⁽⁴³⁾, where fever with headache was the commonest presentation (94.91%). Another study by Tsay et al.⁽⁴⁴⁾ reported fever with chills as predominant symptoms followed by headache among their study participants.

In this study, most participants (90.4%) reported gastrointestinal (GI) symptoms, indicating a high prevalence of such symptoms in the study. This is contradictory to the study by Tsay et al.⁽⁴⁴⁾ where diarrhoea was reported only among 18% of the study participants.

In this study, around 20% of the participants had dyspnoea. This is contradictory to the study by Vargheese et al.⁽⁴⁵⁾ where around 50% of the population had dyspnoea.

In our study, Lymphadenopathy was present in 28.7% of participants, with cervical (8.8%), inguinal (17.6%), and axillary (2.2%) locations being the most common. The majority (71.3%) did not have lymphadenopathy. This is comparable to the study by Tsay et al.⁽⁴⁴⁾ where the incidence of lymphadenopathy was around 33 % among the study participants.

In our study, Eschar was present in 39.7% of participants, with inguinal (16.9%), trunk (10.3%), and axillary (6.6%) locations being the most common. The majority (60.3%) did not have eschar. This is contradictory to the study by Tsay et al.⁽⁴⁴⁾ where around 60% of the population had eschar. This may be due to the difference in the population where the study had been conducted.

In our study, around 31% of the participants had rash. This is in accordance with that of the study by Tsay et al.⁽⁴⁴⁾ where around 21% of participants had clinical rash.

In this study, Leukocytosis was present in 27% of participants and leukopenia was present in around 11% of participants. This is comparable to the study by Tsay et al.⁽⁴⁴⁾ where around 34% of participants had leukocytosis.

In our study, Thrombocytopenia with platelet count less than 50,000 was reported among 12% of the participants. Around 35% had platelet count between 50,000-1,50,000. This is comparable to the study by Tsay et al. (44) where thrombocytopenia was reported among 44% of the individuals. This is contradictory to the study by Vargheese et al.⁽⁴⁵⁾ where thrombocytopenia was seen in around 79% of the study participants.

In our study, elevated SGOT and SGPT was reported in 40% and 32% respectively. This is contradictory to the study by Tsay et al.⁽⁴⁴⁾ where around 80% of the study participants reported an elevation of SGOT and SGPT levels,

In this study, the most common complications were ARDS (10.3%) and MODS (6.6%). Other complications included bleeding (5.1%), pneumonia (5.9%), and encephalitis (1.5%). This is in accordance with the study by Tsay et al.⁽⁴⁴⁾, where the serious complications included pneumonitis 36% (12/33), acute respiratory distress syndrome (ARDS) 15% (5/33), acute renal failure 9% (3/33), myocarditis 3% (1/33) and septic shock 3%.

In this study the mortality was around 2%. This is in contradictory to

the study by Vargheese et al.⁽⁴⁵⁾ where the case fatality rate was around 9.9%.

One patient expired due to Multi Organ Dysfunction Syndrome. Other two patients expired due to Acute Respiratory Distress Syndrome. This is again in accordance with the study by Tsay et al.⁽⁴⁴⁾ where one patient expired due to MODS. In a study by Want et al.⁽⁴⁶⁾, the reported mortality rate of patients developing ARDS in Scrub Typhus was around 25%.

CONCLUSION

- The most common clinical manifestations of Scrub typhus in this study were fever, headache and gastrointestinal symptoms.
- Dyspnoea were the other clinical manifestations that were present in these patients.
- Thrombocytopenia and Leucocytosis were present in nearly one third to one half of the patients.
- Around one third of the patients had elevation in SGOT and SGPT.
- The most common complications were ARDS and MODS. Mortality was seen in patients with MODS and ARDS.

This study throws a light into the burden of Scrub typhus in the particular region.

Limitations Of The Study

Long term complications were not followed up after the recovery from the disease.

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