

SCRUB TYPHUS; A RE-EMERGENT DISEASE: CLINICOPATHOLOGICAL PROFILE AND ITS PROGNOSIS IN A TERTIARY CARE CENTER IN KERALA

Dr. Sanjay Zachariach, Dr. Prasanth Prasad, Dr. Jinu C, Dr. Jarlin John, Dr. Abhijith Varma R

MBBS MD, Associate Professor, Department of General Medicine, Sree Gokulam Medical College and Research Foundation, Venjaramoodu. sanjayzak@gmail.com

MBBS MD, Associate Professor, Department of General Medicine, Sree Gokulam Medical College and Research Foundation, Venjaramoodu. drprasanthprasad11@gmail.com

MBBS MD, Assistant Professor, Department of General Medicine, Travancore Medical College, Kollam. drjinuc@gmail.com

MBBS MD, Associate professor, Department of General Medicine, Sree Gokulam Medical College and Research Foundation, Venjaramoodu. johnjarlin@gmail.com

MBBS MD, Senior resident, Department of General Medicine, Sree Gokulam Medical College and Research Foundation, Venjaramoodu. abhijithvarmar@gmail.com

Corresponding Author: Dr. Jarlin John

johnjarlin@gmail.com

Abstract:

Background: Scrub typhus, caused by the bacterium *Orientia tsutsugamushi*, is a vector-borne disease transmitted to humans through the bite of infected chiggers. It is endemic to the Asia-Pacific region and is associated with significant morbidity and mortality if left untreated.

Methods: In this retrospective study, we analyzed the clinical features, laboratory findings, and complications in 40 patients diagnosed with scrub typhus at a tertiary care center between 2020-2022. Data were extracted from medical records and analyzed using descriptive and inferential statistics.

Results: The study population comprised patients aged 17-75 years, with a relatively equal distribution across genders. Fever, headache, and myalgia were the most common presenting symptoms, while thrombocytopenia and leukocytosis were frequent laboratory findings. Complications such as acute kidney injury, hyponatremia, and hepatic injury were observed in a subset of patients. C-reactive protein (CRP) levels showed a significant positive correlation with total white count but not with the duration of fever or other clinical parameters.

Conclusion: This study provides insights into the epidemiology, clinical presentation, and laboratory features of scrub typhus in our setting. The findings underscore the importance of early recognition and comprehensive management of scrub typhus to mitigate its morbidity and mortality. Further research is warranted to elucidate the pathophysiological mechanisms underlying the disease and improve diagnostic and treatment strategies.

Keywords: Scrub typhus, clinical manifestations, prognostic indicators, CRP, acute kidney injury

Introduction

Scrub typhus, caused by the bacterium *Orientia tsutsugamushi* and transmitted by the bite of infected chiggers, remains a significant public health concern in endemic regions worldwide. Despite advancements in diagnostic techniques and treatment modalities, scrub typhus continues to pose challenges due to its nonspecific clinical presentation and potential for severe complications [1-3].

The epidemiology of scrub typhus is closely linked to environmental factors such as vegetation, altitude, and temperature, which influence the distribution and abundance of chiggers. Endemic regions typically include rural areas with dense vegetation and subtropical climates, where human exposure to chigger bites is more prevalent. In recent years, there has been an alarming increase in the incidence of scrub typhus, attributed partly to climate change and ecological disturbances [4-7].

Clinical manifestations of scrub typhus are diverse and often nonspecific, posing challenges for timely diagnosis and management. The classic triad of fever, eschar, and rash is observed in a minority of cases, while the majority present with fever and various constitutional symptoms such as headache, myalgia, and malaise. Gastrointestinal symptoms including nausea, vomiting, and abdominal pain are common, mimicking other febrile illnesses and contributing to diagnostic dilemmas.

The diagnosis of scrub typhus relies primarily on clinical suspicion coupled with serological tests such as enzyme-linked immunosorbent assay (ELISA) and immunofluorescence assay (IFA). However, the availability of these tests may be limited in resource-constrained settings, leading to diagnostic delays and potential underestimation of disease burden. Molecular techniques such as polymerase chain reaction (PCR) offer higher sensitivity and specificity but are not widely accessible in endemic regions [5-8].

Prompt initiation of appropriate antibiotic therapy, typically with doxycycline or azithromycin, is crucial for reducing morbidity and mortality associated with scrub typhus. However, delays in diagnosis and treatment initiation may result in severe complications, including acute respiratory distress syndrome (ARDS), acute kidney injury (AKI), and multiorgan failure. Therefore, early recognition of clinical features suggestive of scrub typhus and timely institution of empirical treatment are paramount [7-10].

Prognostic indicators in scrub typhus have been studied extensively to identify factors associated with disease severity and poor outcomes. Elevated levels of inflammatory markers such as C-reactive protein (CRP) and procalcitonin have been correlated with disease severity and complications. Additionally, thrombocytopenia, leukocytosis, and derangements in liver and renal function tests have been associated with adverse outcomes in scrub typhus patients.

Despite advances in our understanding of scrub typhus pathogenesis and clinical management, challenges persist in endemic regions, including limited access to diagnostic facilities, suboptimal awareness among healthcare providers, and emergence of antimicrobial resistance. Therefore, concerted efforts are needed to strengthen surveillance, enhance diagnostic capacities, and implement evidence-based management protocols to mitigate the burden of scrub typhus and improve patient outcomes.

Materials and Methods

This retrospective study was conducted at a tertiary care center between 2020-2022, aiming to analyze the clinical manifestations and prognostic indicators in patients diagnosed with scrub typhus. The study protocol was approved by the institutional ethics committee, ensuring adherence to ethical guidelines and patient confidentiality.

Study Population: The study included patients of all age groups who presented to the tertiary care center with clinical features suggestive of scrub typhus and subsequently tested positive for scrub typhus serology. Patients with incomplete medical records or those with alternative diagnoses explaining their symptoms were excluded from the analysis.

Data Collection: Medical records of eligible patients were reviewed to extract demographic information, clinical history, presenting symptoms, laboratory investigations, treatment details, and outcomes. Data were entered into a predesigned proforma, ensuring uniformity and accuracy in data collection. Patient identities were anonymized to maintain confidentiality.

Laboratory Investigations: Serological confirmation of scrub typhus was based on the detection of IgM antibodies against *Orientia tsutsugamushi* using enzyme-linked immunosorbent assay (ELISA) or immunofluorescence assay (IFA). Other laboratory investigations included complete blood count (CBC), C-reactive protein (CRP), liver function tests (LFTs), renal function tests (RFTs), and electrolyte levels. These parameters were measured at the time of presentation to assess disease severity and predict clinical outcomes.

Statistical Analysis: Statistical analysis was performed using appropriate software (SPSS ver 21) to analyze the association between clinical variables and disease outcomes. Descriptive statistics such as mean, median, standard deviation, and proportions were calculated to summarize the demographic and clinical characteristics of the study population. Inferential statistics, including chi-square test, t-test, or ANOVA, were used to evaluate the significance of associations between variables. A p-value < 0.05 was considered statistically significant.

Results

Table 1: Age Distribution of Scrub Typhus Patients: The majority of scrub typhus patients in our study were aged between 51-70 years, comprising 60% of the total cases. Patients aged ≤ 20 and >70 years accounted for 7.5% and 10% of the cases, respectively.

Table 2: Gender Distribution of Scrub Typhus Patients: Among the scrub typhus patients, 52.5% were male and 47.5% were female, indicating a relatively equal gender distribution in our study population.

Table 3: Age and Gender Distribution of Scrub Typhus Patients: The distribution of scrub typhus patients across different age groups varied slightly between males and females. However, no significant differences were observed in the age distribution between genders.

Table 4: Frequency of Clinical Symptoms in Scrub Typhus Patients: Fever was the most common symptom observed in all scrub typhus patients, followed by headache and myalgia. Less frequent symptoms included vomiting and eschar.

Table 5: Laboratory Parameters in Scrub Typhus Patients: Scrub typhus patients exhibited elevated C-reactive protein (CRP) levels, indicating an inflammatory response. Thrombocytopenia and leukocytosis were also common hematological findings. Additionally, renal and hepatic dysfunction, as evidenced by abnormal urea, serum creatinine, SGPT, and SGOT levels, were observed in some patients.

Table 6: Frequency of Complications in Scrub Typhus Patients: Approximately 22.5% of scrub typhus patients developed acute kidney injury, while thrombocytopenia was observed in 47.5% of cases. Other common complications included hyponatremia, hypoalbuminemia, and hepatic injury.

Table 7: Correlation of CRP with Other Parameters in Scrub Typhus Patients: C-reactive protein (CRP) levels showed a significant positive correlation with total white count, indicating a strong inflammatory response in patients with higher CRP levels. However, no significant correlations were found between CRP levels and the duration of fever, erythrocyte sedimentation rate (ESR), or neutrophil count.

Table 1: Age Distribution of Scrub Typhus Patients

Age Group	Frequency	Percent
≤ 20	3	7.5
21-30	2	5
31-40	7	17.5
41-50	5	12.5
51-60	9	22.5
61-70	10	25
>70	4	10
Total	40	100

Table 2: Gender Distribution of Scrub Typhus Patients

Sex	Frequency	Percent
Male	21	52.5
Female	19	47.5
Total	40	100

Table 3: Age and Gender Distribution of Scrub Typhus Patients

Age Group	Male (n)	Male (%)	Female (n)	Female (%)	Total (n)	Total (%)
≤ 20	2	9.5	1	5.3	3	7.5
21-30	1	4.8	1	5.3	2	5
31-40	4	19	3	15.8	7	17.5
41-50	2	9.5	3	15.8	5	12.5
51-60	5	23.8	4	21.1	9	22.5
61-70	5	23.8	5	26.3	10	25
>70	2	9.5	2	10.5	4	10
Total	21	100	19	100	40	100

Table 4: Frequency of Clinical Symptoms in Scrub Typhus Patients

Symptoms	Frequency	Percent
Fever	40	100
Myalgia	19	47.5
Headache	21	52.5
Vomiting	11	27.5
Eschar	3	7.5
Scrub IgM	40	100

Table 5: Laboratory Parameters in Scrub Typhus Patients

Parameter	Mean ± SD	Range	Median	IQR
Age	49.93 ± 16.941	17 - 75	52	35.25 - 65
Fever Duration	3.9 ± 2.193	1 - 9	4	2 - 5.75
CRP Value	72.2 ± 30.4	23.3 - 171.6	71.485	45.975 - 92.213
Hemoglobin (Hb)	13.3 ± 1.3	8.8 - 15.6	13.35	12.425 - 14.275
Total White Count	9970 ± 4656.1	4000 - 19500	8900	5975 - 13525
Neutrophil	68.5 ± 14.315	35 - 92	69	57 - 78.75

Lymphocyte	26.83 ± 12.991	6 - 57	26.5	18.25 - 40
Monocyte	4.45 ± 3.396	1 - 15	3	2 - 5.75
Eosinophil	0.03 ± 0.158	0 - 1	0	0 - 0
Basophil	0 ± 0	0 - 0	0	0 - 0
Erythrocyte Sedimentation Rate (ESR)	48 ± 29.609	11 - 120	35.5	25.5 - 65.75
Platelets	152375 ± 52965.73	52000 - 260000	150000	120000 - 206750

Table 6: Frequency of Complications in Scrub Typhus Patients

Complication	Frequency	Percent
Acute Kidney Injury	9	22.5
Thrombocytopenia	19	47.5
Hyponatremia	32	80
Hypokalemia	6	15
Hyperkalemia	2	5
Hypoalbuminemia	31	77.5
Hepatic Injury	26	65
Hyperbilirubinemia	33	82.5

Table 7: Correlation of CRP with Other Parameters in Scrub Typhus Patients

Parameter	Pearson Correlation Coefficient (r)	p-value
Duration of fever in days	-0.169	0.297
Total white count	0.478	0.002
Erythrocyte sedimentation rate (ESR)	0.118	0.467
Neutrophil count	0.115	0

Discussion

The findings of our study shed light on various aspects of scrub typhus, including its epidemiology, clinical presentation, laboratory features, and complications. Scrub typhus predominantly affected individuals in the middle to older age groups, with the majority of cases observed in patients aged 51-70 years. This demographic pattern is consistent with

previous studies, which have also reported higher incidence rates among older adults [1]. The gender distribution was relatively balanced, with no significant differences observed between males and females, indicating that scrub typhus affects both genders equally.

The clinical presentation of scrub typhus varied widely, with fever being the most common symptom, followed by headache and myalgia. These findings are consistent with the classic manifestations of scrub typhus, characterized by an acute febrile illness accompanied by systemic symptoms [2]. However, it is noteworthy that eschar, a pathognomonic feature of scrub typhus, was observed in only a small proportion of patients in our study. This underscores the importance of considering scrub typhus in the differential diagnosis of febrile illnesses, even in the absence of eschar, particularly in endemic regions.

Laboratory investigations revealed several notable findings in scrub typhus patients. Elevated C-reactive protein (CRP) levels were universally observed, indicating the presence of an inflammatory response. This is consistent with previous studies highlighting the utility of CRP as a diagnostic marker for scrub typhus [3-5]. Thrombocytopenia and leukocytosis were common hematological abnormalities, reflecting the systemic nature of the disease and its propensity to affect multiple organ systems. Additionally, renal and hepatic dysfunction were observed in a subset of patients, underscoring the potential for severe complications in scrub typhus.

The correlation analysis revealed a significant positive correlation between CRP levels and total white count, suggesting a strong inflammatory response in patients with higher CRP levels. However, no significant correlations were found between CRP levels and the duration of fever, erythrocyte sedimentation rate (ESR), or neutrophil count. These findings highlight the complex interplay between inflammatory markers and clinical parameters in scrub typhus and emphasize the need for further research to elucidate the underlying pathophysiological mechanisms [6-10].

The high prevalence of complications such as acute kidney injury, thrombocytopenia, and electrolyte abnormalities underscores the potential severity of scrub typhus and the importance of vigilant monitoring and prompt intervention. Early recognition of clinical features suggestive of scrub typhus, coupled with appropriate diagnostic testing and empirical treatment, is crucial for improving patient outcomes and reducing morbidity and mortality associated with the disease.

Conclusion

In conclusion, our study provides valuable insights into the epidemiology, clinical presentation, laboratory features, and complications of scrub typhus. The findings underscore the importance of maintaining a high index of suspicion for scrub typhus in febrile patients, particularly in endemic regions, and highlight the need for comprehensive management strategies to mitigate the burden of the disease.

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