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Original Research Article

Analysis of Clinical and Biochemical Parameters in Scrub Typhus Patients in Central India

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Conflict of interest: Nil

Abstract:

Background: Scrub typhus is probably one of the most common underdiagnosed and under-reported febrile illnesses requiring hospitalization because of its non-septic clinical manifestations and lack of access to specific laboratory facilities.

Aim: This study was undertaken to assess the clinical, hematological, and biochemical profile of the patients diagnosed with scrub typhus in our tertiary care teaching hospital.

Materials & Methods: This was an institution-based, observational, and cross-sectional study, enrolled patients presenting with febrile illness and diagnosed as scrub typhus. We have asses their clinical features and laboratory investigations and compared with the non-scrub typhus patients.

Results: A total of 570 clinically suspected patients were analysed, out of that 104 (18.3%) found positive for Scrub typhus by serology**.** Majority of the patients (51%) were 21-50 years age group, predominantly female (52.9%). Fever, headache and nausea/vomiting were the most common symptoms. Liver and renal failure was the common complication of scrub typhus. Hemoglobin, total leukocyte counts, platelets counts, Random blood sugar, SGOT, SGPT, serum urea and creatinine were significantly difference between scrub typhus and non-scrub typhus patients ($p<0.05$).

Conclusion: Increased awareness coupled with high index of suspicion amongst treating doctors with good knowledge of epidemiology and laboratory investigations is needed for an early diagnosis of scrub typhus.

Keywords: Scrub typhus, Fever, clinical profile, biochemical parameters, Eschar

Introduction

Scrub typhus is the most common rickettsial disease prevalent in India. It is caused by Orientia tsutsugamushi, an obligate intracellular gram negative bacteria and transmitted to humans through the bite of larval forms of trombiculide mites. [1] The organism was discovered in endothelial cells of the brain, heart, lung, liver, kidney, pancreas, and cardiac muscle cells, as well as macrophages of the spleen and liver, in paraffin-embedded autopsy tissue samples. [2] Focal or disseminated vasculitis is the pathologic characteristic of scrub typhus, which can cause single or multi organ dysfunction. [3] Scrub typhus is grossly under diagnosed in India because of their nonspecific presentations, less awareness in patients as well as in clinicians (esp. that serologic testing is not useful acutely) and lack of facilities for diagnosis and treatment in periphery (like PCR based diagnosis). [4] The World Health Organization has dubbed scrub typhus one of the world's most under diagnosed/underreported diseases that often requires hospitalization. [5] In the initial phase of the disease, the laboratory parameters will be normal but get deranged later. Most of the studies have noticed neutrophilia and lymphocytopenia. The hepatic and renal biochemical parameters may also get deranged in severe cases. [6,7] The mortality of scrub typhus in untreated patients range from 0% to 30% and tends to vary with age and region of infection. The involvement of lungs has been described which range from bronchitis and interstitial pneumonitis to ARDS. ARDS is one of the serious complications of scrub typhus, which has high morbidity and mortality. The occurrence of ARDS is high in scrub typhus patients who were

diagnosed late and received antibiotics late. [8,9,10]

In recent years, we have noticed an increase in the incidence of Scrub Typhus at our institute. So, we planned this study with an aim to study the demographic, Clinical and biochemical profile in patients of Scrub Typhus.

Material and Methods

The present study is an institution-based, observational, and cross-sectional study and it is carried out in the department of microbiology at a tertiary care medical college, Central India. The study group consists of patients diagnosed with scrub typhus present in our hospital during the study period.

Inclusion Criteria

- All patients, diagnosed with Scrub typhus, with or without eschar
- Patient's age ranged from 15-70 years of age with both gender
- Participants who provides written informed consent for the study
- Patients admitted in our hospital who were tested positive for IgM Antibody against *O. tsutsugamushi* by ELISA

Exclusion Criteria

- Patients diagnosed some other associated infection and other causes of acute febrile illness
- Patients age<15 or ? 70 year of age
- Those who had not given Informed consent to participate in this research

Data collected regarding patients' socio-demographic profile, symptoms, clinical findings, laboratory, and radiological findings.

Standard Diagnostics (SD) Bioline Tsutsugamushi solid phase immuno-chromatographic assay (SD, Korea) – a one step immune-chromatographic assay which detects IgM, IgG and IgA antibodies against *O. tsutsugamushi*, in the serum, was used to make a diagnosis. Clinical findings and other relevant investigations data were retrieved from the case files of the serologically positive patients and studied.

The profile of laboratory investigation of various laboratory parameters of all the patients was recorded and all laboratory biochemical and hematological parameters were correlated with the scrub typhus.

Statistical Analysis: Data collected in the proforma were collated in MS Excel and analyzed statistically using SPSS software version 22.0 and interpreted according to frequency distribution, percentage and $\chi 2$ test. In statistical analysis $p<0.05$ was considered statistically significant.

Result

A total of 570 clinically suspected febrile patients were analysed in our study, out of which 104 (18.3%) were serologically positive for scrub typhus. The age ranges of the serologically positive patients were of a wide age range from 15-70 years, most of the patients were 21-50 years age groups. Female were predominant (52.9%) over the male participants. Majority of the patients residing in rural area (81.7%) and belongs to lower socio-economic class (42.3%). Many patients (80.8%) found duration of illness was 8-14 days [Table 1]

Table: 1 Socio-demographics profile of enrolled Scrub typhus patients (N=104)

Characteristic		No. of cases	Percentage
Age	≤ 20 Years	26	25%
	21-50 Years	53	51%
	>50 Years	25	24%
Sex	Male	49	47.1%
	Female	55	52.9%
Socio-economic status	lower	44	42.3%
	Middle	36	34.6%
	Upper	24	23.1%
Duration of illness (Days)	≤ 7 Days	15	14.4%
	8-14 Days	84	80.8%
	>14 Days	5	4.8%
Residence	Rural	85	81.7%
	Urban	19	18.3%

Table 2 shows the clinical presentation of scrub typhus patients, majority of the presented with the chief complaints of fever (100%), headache (68.3%), Nausea/Vomiting (57.7%) and altered sensorium in 50% cases. Other sign and symptoms were Breathlessness, Jaundice and eschar

Table 2: Clinical profiles of Scrub typhus patients

Symptoms	No. of cases	Percentage
Fever	104	100%
Breathlessness	19	18.3%
Nausea/Vomiting	60	57.7%
Headache	71	68.3%
Jaundice	31	29.8%
Altered Sensorium (A/S)	52	50%
Eschar	9	8.6%

Statistically significant difference ($p<0.05$) were found in the laboratory parameters: haemoglobin, TLC, platelets count, SGOT, SGPT, serum urea, creatinine and RBS between scrub typhus and non-scrub typhus group [Table: 3]

Table 3: Comparison of laboratory parameters in scrub typhus and non-scrub typhus groups

Parameters	Scrub typhus (104)	Non scrub typhus (466)	P-Value
	Mean ± SD	Mean ± SD	
Hb (mg/dL)	11.3 ± 1.6	12.6 ± 1.3	<0.001
WBC (x 10^3/ dL)	9.4 ± 4.3	7.11 ± 2.73	<0.001
RBC (x 10^6/ µL)	3.8 ± 0.94	4.3 ± 0.53	<0.001
Platelet (x 10^3/ dL)	135.7 ± 112.27	168.8 ± 119.45	0.010
Bilirubin (mg/dL)	1.23±1.22	1.01± 1.21	0.094
SGOT (units/L)	138.4 ±122.26	104.03 ±133.13	0.016
SGPT (units/L)	106.45 ± 145.3	82.11 ±105.01	0.048
Urea (mg/dL)	49.77 ±38.83	39.88 ±33.14	0.008
Creatinine (mg/dL)	1.22 ± 0.54	1.03 ± 0.45	0.002
RBS (mg/dL)	124.41 ± 55.33	102.5 ± 20.12	<0.001

Common complications seen in scrub typhus patients were Liver failure, Renal failure, Thrombocytopenia, Lymphadenopathy, ARDS and shock. [figure:1].

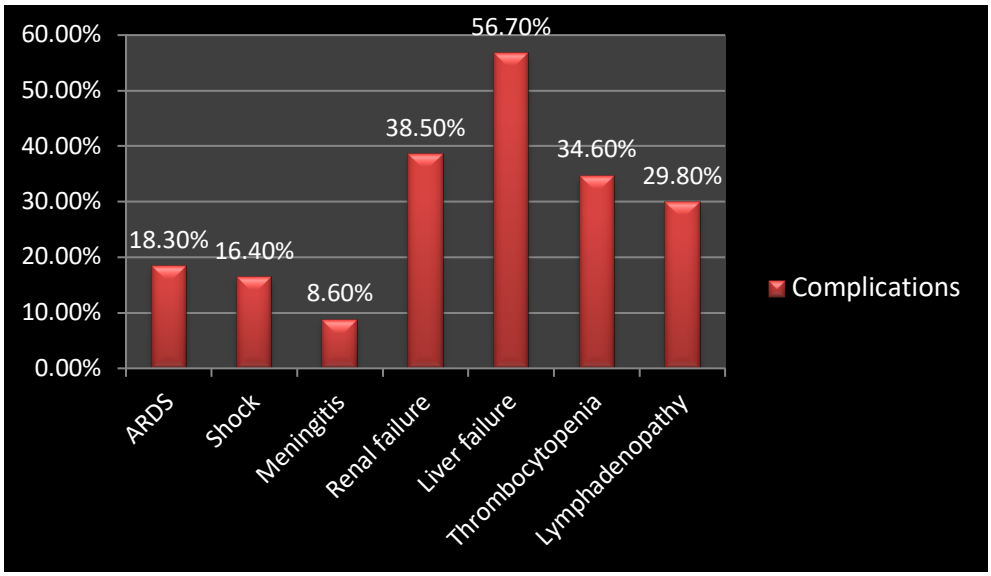

Figure: 1 Complications in Scrub typhus patients

Discussion

Failure of timely diagnosis of scrub typhus leads to significant morbidity and mortality. With timely diagnosis, treatment is easy, affordable and often successful with dramatic response to antimicrobials. Antimicrobials effective for Rickettsial disease are usually not included in empirical therapy of nonspecific febrile illnesses, treatment of rickettsia disease is not provided unless they are suspected [11].

In the present study incidence of scrub typhus was 18.3%, concordance with the study conducted by Huidrom S, et al [12].

In our study most of the scrub typhus participants were 21-50 years age groups, predominantly female, similar findings are reported by Mandal, *et al* [13] and S Shrestha et al [14].

Current study observed majority of the patients resided at rural areas and belongs to lower socio-

economic class, our results comparable with the Xu P, et al [15] and Thapa S et al [16].

Present study presented with duration of illness was of 8 to 14 days in most of these patients, accordance to Saleem et al [17].

In our study fever was seen in 100% cases followed by other presenting symptoms like headache, nausea/vomiting, altered sensorium, jaundice, breathlessness and eschar. Our finding was correlate with many other studies: Pokhrel et al [18], Pathak et al [19], Das et al [20] and Varghese et al [21], reported fever in 100%cases in their study.

Many of the patients in the present study group had increased serum SGOT, SGPT and Bilirubin levels. Majority of the patients in the present study group had deranged liver functions (raised AST, ALT, and bilirubin).

Present study found significant difference of hematological and biochemical laboratory parameters (hemoglobin, TLC, platelets, SGOT, SGPT, serum urea, creatinine, and RBS) between scrub typhus group and non scrub typhus group ($p<0.05$), similar observation seen in other studies: M. Rantanen et al [22], Kim et al [23], George T et al [24] and Chunduru k et al [25]. Lower levels of hemoglobin, platelet count, serum albumin and higher levels of total leukocyte count, hepatic transaminases, and serum creatinine correlated with severity.

Common complications of scrub typhus were liver failure, renal failure, thrombocytopenia and lymphadenopathy found in current study, consistent results observed by Sinha P, et al [26] and Takhar et al [27].

The need for increasing awareness, amongst doctors, that Scrub typhus is an emerging rickettsial febrile illness, often seen in rural areas of India, is shown by the current study. Clinician need to be made aware of the requirement of a high index of suspicion with the proper use of diagnostic methods to ensure that cases are not missed during diagnosis

Conclusion

Scrub typhus has emerged as an important cause of febrile illness with varying clinical manifestations with or without eschar. Knowledge of geographical distribution, evidence of exposure to vector, clinical features and laboratory investigation: Lower levels of hemoglobin, platelet count, serum albumin, and higher levels of total leukocyte count, hepatic transaminases, serum urea and creatinine were high index of suspicion are crucial factors for early diagnosis and timely treatment of scrub typhus.

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