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Scrub typhus in Gujarat

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Abstract

Background:

Scrub typhus is a zoonotic disease caused by *Orientia tsutsugamushi*, an obligate intracellular gram-negative bacterium. It is transmitted via the larval stage of trombiculid mites (chigger, a primary reservoir). It is prevalent across southern and eastern India including Rajasthan. Therefore present research was carried out with an objective to study the clinical profile and treatment outcome in scrub typhus patients in Gujarat.

Method:

In this study, total 100 patients with an acute febrile illness diagnosed as scrub typhus by positive IgM antibodies against *O. tsutsugamushi* were enrolled, over a period of two months (August to October 2023). All relevant data were recorded and analysed.

Results:

Among 100 cases, 52% patients reported from urban area and 48% patients from rural area. The mean age of patients was 43.75 ± 16.82 years, ranged from 12-83 years with female predominance (male: female-1:1.37). Fever (100%), cough (40%) breathlessness (40%), altered sensorium (13%) and headache (11%) were the predominant clinical features. Eschar was seen in 33 patients. Renal (63%) and hepatic dysfunction (58%) was the commonest followed by respiratory dysfunction (49%). All patients (except pregnant patients) were treated with oral or inj.doxycycline. Seventeen patients needed mechanical ventilation and five patients required dialysis. Total 24 patients died during the study period.

Conclusion:

Scrub typhus has become a leading infectious disease causing acute febrile illness. It should be considered as a differential diagnosis with high index of suspicion for acute febrile illness in patients from this region, as early diagnosis and intervention may reduce mortality.

KEY WORLD- scrub typhus, *Orientia tsutsugamushi*, Gandhinagar

INTRODUCTION

Orientia tsutsugamushi belongs to the Rickettsiae group of obligately intracellular, gram-negative coccobacilli and short bacilli. *O. tsutsugamushi* differs substantially from *Rickettsia* species both genetically and in cell wall composition (i.e., it lacks lipopolysaccharide). It persists by transovarial transmission in trombiculid mites¹. Chiggers (only stage to transmit disease) inoculate organisms into the skin.

Scrub typhus is an endemic and a re-emerging disease in eastern and southern Asia. In high-risk areas the prevalence could be >3% of the population. Immunity is not long lasting and the organism exhibits remarkable antigenic diversity². Approximately one million cases are reported annually³.

The illness could be self-limiting to fatal. Incubation period is 6-21 days (average 10-12 days). Onset is characterized by fever, headache, myalgia, associated with cough, nausea, diarrhea and vomiting. The peculiar eschar at the bite site, lymphadenopathy and maculopapular rash may or may not be seen⁴. It is considered a differential diagnosis in patients with acute febrile illness which is associated with hepatic dysfunction, thrombocytopenia, renal impairment, altered sensorium, pneumonitis or ARDS⁵. Other gastro-intestinal manifestations reported include acute acalculous cholecystitis, duodenal ulcer perforation, peritonitis and gastric ulceration and pancreatitis⁶. The mortality rate for untreated patients is 7-30% which can be prevented by early recognition of this treatable disease⁷.

AIMS AND OBJECTIVES

1. To identify scrub typhus as an important aetiological agent of acute febrile illness in udaipur region.
2. To describe the clinical features, manifestations and complication in patients diagnosed with scrub typhus.
3. To know about its atypical clinical presentations.

MATERIALS AND METHODS

In this retrospective observational study, data of patients admitted from 1st August 2022 to 1st October 2022 at Department of Medicine in Geetanjali Medical College of diagnosed scrub typhus cases with positive IgM was analyzed. All demographic data, detailed history, blood investigations, organ involvement, any comorbid illnesses were recorded. Area of residence, detailed clinical examination, presence or absence of eschar was noted. All patients received oral or injection doxycycline along with other supportive care. ANC patients were given azithromycin. Final outcome were noted and cause of death was evaluated.

OBSERVATIONS AND RESULTS

During the period of August and September total 500 patients of fever were investigated to establish the cause of fever. Out of these 200 were positive for IgM for scrub typhus. Out of these 200, 100 patients needed indoor admission. Data of these 100 patients were recorded.

In our study mean age of patients was 43.75±16.82 with female preponderance (M:F = 1:1.37) .52% patients reported from urban area and 48% patients from rural area. Most of the patients (60%) did not have co-morbidity. Patients with comorbid illness and demographic characteristics are shown in Table 1.

The clinical features of scrub typhus patients at the time admission have been shown in Table 2. The most common clinical presentation was fever with chills which was present in all cases, and other presentation were cough (40%) breathlessness (40%), fever with altered sensorium (9.28%) and headache (11%). Majority of patients (54.28%) had onset of illness ranging from 5 to 15 days. Eschar was seen in 33% patients. Various sites of eschar are shown in Table 2.

Laboratory investigations are shown in Table 3. Low platelet counts and abnormal renal functions were frequently abnormal. 49.85% of patients had involvement of three or more organ systems. Renal (63%) and hepatic dysfunction (58%) was the commonest followed by respiratory dysfunction (49%), (Table 4). Twenty nine patients had multiorgan dysfunction involving CNS, Cardiovascular, pulmonary, renal and hepatic system during the course of hospitalization. Among the 49 patients with respiratory dysfunction, ARDS (41; 69.49%) was the commonest, followed by pleural effusion (5, 10.20%) and pulmonary infiltrates on chest X-ray (3, 6.12%).

All patients were treated with oral or inj doxycycline, pregnant patients were treated with azithromycin, and those with complications were treated with standard care. Seventeen patients needed mechanical ventilation and five patients required dialysis. Most of the patients (76%) were discharged from the hospital and (24%) patients were died within 1-15 days of admission. The average duration of hospital stay was 5.2 days.

Table 1: Baseline characteristics and co-morbidity of study population

Characteristics	Number of Patients(%)
Age (Years)	12-29
	25
	30-39
	15
	40-49
	20
	50-59
	17
	60-69
	16
	70-79
	6
	>80
	01
Gender	Male
	43
	Female
	58
Residence	Urban area
	52
	Rural area
	48
Co-morbidity	No. of Patients (%)
Hypertension	11
Diabetes Mellitus	9
Dengue	05
PNC	05
ANC	04
Anemia	03
Hyperthyroidism	03
None	60

Table 2: Clinical features and Site of Eschar

Sign and Symptoms	No. of Patients (%)
Fever	100
Cough	40
Breathlessness	40
Eschar	33
ALT Sensorium	13
Headache	11
Abdominal Pain	9
Jaundice	05
Fever With Rash,	02
Vomiting	02
Burning Micturition	01
Bodyache,	01
Oral Ulcers	01
Chest Pain	01
Site of eschar on the body	No. of patients (%)
Head and face	0
Neck	2
Arm and axilla	12
Thorax and breast	4
Back	3
Abdomen	6
Groin and Buttok	4
Thigh and leg	2

Table 3: laboratory investigation

Table 4: Organ system dysfunction during the stay in hospital

Investigation	No. of Patients (%)
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Total leucocyte count <4000/ cmm	22	Organ/system	Frequency of dysfunction (%)
Total leucocyte count >11 000/cmm	41	Respiratory	49
Anaemia	67	Cardiovascular	31
Platelet count <100 000/cmm	70	Renal	63
Elevated transaminase levels	69	Central nervous system	38
Increased bilirubin	25	Liver	58
Increased urea/creatinine	72		

Discussion

India is an integral component of “tsutsugamushi triangle” which depicts a part of the globe endemic to scrub typhus. Owing to frequent outbreaks witnessed in different parts of the country in the recent past, scrub typhus is thought to be the commonest occurring rickettsial infection in India and the mortality from untreated scrub typhus remains unknown.⁴ Central India witnessed an outbreak of scrub typhus in the months of August, September and October. Till now there are no reports of scrub typhus from our region. During the month of Aug to Oct we investigated 500 patients presented for acute febrile illness, out of which 200 turned positive for scrub typhus. Out of positive cases, 100 patients needed admission. We hereby present data of these indoor patients. In current study in contrast to other studies, more number of patients was from urban area that didn't have history of exposure to vegetation. When we surveyed the literature to know the source of infection in such patients, it was found that rodents carry the mites on their skin, which can transmit disease to the humans.⁵ And also when the rodents from the areas where the patients were hailing from were examined by a team from veterinary college, Nagpur, found the presence of mites on the bodies of rodents.

The majority of our patients were aged between 12 and 29 years similar to Sinha et al study.^[8] In an outbreak report from Rajasthan India, Sinha et al^[8] reported scrub typhus in more number of females than males (66.7% Vs 33.3% respectively).

The clinical manifestations of this disease vary from minimal disease to severe fatal illness with multi-organ dysfunction. The commonest presenting symptoms were fever, cough and shortness of breath. Fever is almost universal in these cases and was seen in all cases. Fever can be of short (<7 days) or long (>7 days) duration. Rama et al⁸ reported 28% and 72% cases with fever of short and long duration respectively. Thirteen patients presented with altered sensorium, similar to other studies.^{9,10} The presence of an eschar is a valuable clinical clue in the diagnosis of scrub typhus (though its frequency varies from 7-97%).¹¹ A study done by Chanta et al¹² shows that eschar, a pathognomonic sign of scrub typhus, were present in 75% of the presented patients and were usually painless and single, and a study done by Sudhakar et al¹³ shows all patient of diagnosed scrub typhus had eschar mark, differs from our study where only thirty three patients (23.57%) had eschar. So the suspicion of the disease could not be made on the basis of eschar mark only.

Scrub typhus is a cause of multi-organ dysfunction. Nearly half of our patients (49.85%) had three or more organ systems involved while 29 patients (20.71%) had evidence of dysfunction of five organs during the course of their hospital stay. Complications in scrub typhus develop after the first week of illness. Narvencar et al¹⁴ found hepatic dysfunction to be the most common followed by ARDS, circulatory collapse and acute renal failure. We found renal dysfunction in 73 patients, followed by hepatic dysfunction 68 patients. However, the abnormalities in cell counts, liver and renal functions in our patients were consistent with those reported in other studies.^{2,15} Among patients who presented with any central nervous system manifestations, CSF examination was performed in all patients, CSF examination was acellular but with increased protein with normal sugar levels. However,

Viswanathan et al¹⁶ had 17 patients with meningitis among 65 of their patients. This is possibly because they specifically searched for patients with scrub typhus and meningitis. Scrub typhus should be considered in the differential diagnosis of meningoencephalitis, especially when accompanied by renal failure or jaundice.¹⁷ Previous studies from India have reported meningoencephalitis in 9.5%–23.3% of patients.¹⁸

The mortality in patients with scrub typhus had wide variations and depends on the circulatory load of *O. tsutsugamushi*, early or late presentation and treatment modality. Deaths are attributable to delayed presentation or diagnosis, and development of MODS. Complications such as ARDS, renal failure and hepatic involvement are independent predictors of mortality.¹⁹ The mortality rate of 17.14% in our study was closely similar to the study from India by Kumar et al,²⁰ (Mortality 17.2%). Initially, in our patients mortality was high. But subsequently we noticed eschar in one patient who was admitted as a case of acute febrile illness with multi organ failure (MODS). Later on we started suspecting scrub typhus in patients admitted as acute febrile illness with MODS. This created awareness in health department as well as in doctors who started investigating patients for scrub typhus and using tablet doxycycline for the patients of fever. This resulted in decrease mortality in patients admitted later. As such it's not a lethal disease. But when there is multi organ involvement, prognosis is bad.

CONCLUSION

Scrub typhus should be considered as an important differential of acute febrile illness. It can present as pneumonitis, meningoencephalitis and acute hepatitis, and should be considered as a differential diagnosis in the patients with acute febrile illness. Delayed treatment may lead to complications and high mortality rate. Empirical treatment with doxycycline is recommended in cases of strong suspicion.

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