

**Research Article****Recent outbreak of scrub typhus in Western part of India, Rajasthan**Naveen Saxena<sup>1</sup>, Pooja Jain<sup>2</sup>, Rakesh Singh<sup>3</sup><sup>1</sup>Associate Professor, <sup>2</sup>Assistant Professor, Department of Microbiology, Government Medical College, Kota, Rajasthan, India<sup>3</sup>Associate Professor, Department of Pathology, Government Medical College, Kota, Rajasthan, India**\*Corresponding author**

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**Abstract:** Scrub typhus usually affects previously healthy active persons and if undiagnosed or diagnosed late, may prove to be life-threatening. Diagnosis of scrub typhus should be largely based on a high index of suspicion and careful clinical, laboratory and epidemiological evaluation. To describe the diverse clinical and laboratory manifestations of scrub typhus diagnosed in MBS Hospital, Kota. All cases of febrile illness diagnosed as scrub typhus over a period of 2 months were analysed. Diagnosis was based on ELISA test for antibody detection against 56 kDa antigen. Twenty Four cases of scrub typhus were seen over a period of 2 months (November. 2014-December. 2014). Common symptoms were high grade fever of 4-30 days duration, cough, haemoptysis and breathlessness. Eschar was seen in 6 patients. Liver enzymes were elevated in most of the cases (83.3%). Multiple organ dysfunction syndromes (MODS) was present in 16.66% of the patients (4 out of 24). Hypotension (2 patients. 8.3%). renal impairment (15 out of 24 patients. 62.5%), acute respiratory distress syndrome (4 patients. 16.66%) and meningitis (3 patients. 12.5%) were some of the important complications. There was a dramatic response to doxycycline in nearly all the patients. Scrub typhus has emerged as an important cause of febrile illness in Kota and nearby districts. Empirical treatment with doxycycline is justified in endemic areas.

**Keywords:** 56 kDa antigen, eschar, scrub typhus.

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**INTRODUCTION**

Scrub typhus is a zoonotic disease transmitted by the larval mites (chiggers) of *Leptotrombidium deliense* group. Man is accidentally infected when he encroaches the mite-infested areas, known as the mite islands. However, the infection can occur in diverse habitats like seashore, rice fields and even semi-deserts [1].

*Orientia tsutsugamushi*, the agent of scrub typhus, a strict intracellular bacterium is endemic to a geographically distinct region, the so-called tsutsugamushi triangle, which includes Japan, Taiwan, China and South Korea.[2] In India, the disease had occurred among troops during World War II in Assam and West Bengal, and in the 1965 Indo-Pak war. There was a resurgence of the disease in 1990 in a unit of an army deployed at the Pakistan border of India [3]. It was known to occur all over India, including Southern India[4] and Northern India [5]. However, in later years, the disease virtually disappeared, probably because of widespread use of insecticides to control other vector borne diseases, empiric treatment of febrile illnesses with tetracycline and chloramphenicol by practitioners and changes in lifestyle. Recent reports from India and

other neighbouring countries suggest that there is a resurgence of scrub typhus infection in these parts of the world and that the resurgence is associated with considerable morbidity and mortality [6].

Scrub typhus is grossly under-diagnosed in India because of its nonspecific presentation, low index of suspicion and the paucity of confirmatory diagnostic resources [6].

Serious complications of scrub typhus are not uncommon and may be fatal; they include pneumonia, myocarditis, meningoencephalitis, acute renal failure and gastrointestinal bleeding. Early diagnosis is important because there is usually an excellent response to treatment and timely antimicrobial therapy may help prevent complications. In developing countries with limited diagnostic facilities, it is prudent to recommend empiric therapy in patients with undifferentiated febrile illness having evidence of multiple system involvement [7].

In this study, we report, a recent outbreak of scrub typhus recorded during the cooler months (November 2014-December 2014) in patients

admitted to MBS hospital with acute febrile illness associated with diverse signs and symptoms.

**MATERIAL AND METHODS**

A total of 130 clinically suspected cases were examined and investigated for scrub typhus, over a period of 2 months (November 2014 to December 2014). Detailed clinical examination including a careful search for eschar was made in all patients. Basic laboratory tests were done in these cases (complete blood count, peripheral smear, urine analysis, urea, keratinine, glucose, liver function tests). Additional investigations including blood culture, chest X-ray, Widal, rapid card test for malarial antigen, serology for dengue were also done in the majority of patients. In addition, ELISA test based on detection of IgM antibodies against 56-KDa antigen (In Bios International Inc., USA), was also done in all these patients. Other investigations were

done as indicated (USG abdomen, urine culture) to establish the cause of fever.

**RESULTS**

18.4% (24/130) patients were diagnosed to have scrub typhus during the study period of 2 months. The age ranged from 2 years to 80 years. There were 58.33% (14/24) females and 41.66% (10/24) males. Most of the patients were of rural background belonging to villages of Kota and District Baran.

Table 1, shows the signs and symptoms in these 24 cases. Most of the patients presented with bilateral lower zone pneumonitis with hemoptysis. Common symptoms were cough, hemoptysis, fever, breathlessness, myalgia, headache, etc. Common signs were increased respiratory rate, rhonchi and crepts, fever, pleural effusion, etc. Eschar was seen in 6 patients.

**Table-1: Symptoms and signs**

Symptoms	Number	Percentage	Signs	Number	Percentage
Fever <7 days	10	41.66	Temp<101 F	17	70.83
Fever 7-14	13	54.16	Temp>101 F	6	25
Fever> 14	1	4.16	BP<90 mmHg	2	8.33
Myalgia	11	45.83	Resp rate>30	20	83.33
Cough	24	100	Hepatomegaly	15	62.5
Haemoptysis	15	62.5	Splenomegaly	10	41.66
Headache	8	33.33	Rhonchii and crepts	17	70.83
Breathlessness	21	87.5	Pleural effusion	11	45.83
Nausea/vomitin	9	37.5	Eschar	6	25
Abdominal pain	4	16.66	Macular rash	3	12.5
Diarrhoea	3	12.5	Altered sensorium	5	20.8

Table 2, shows the laboratory parameters in these patients. Total leucocyte count was nearly normal in the majority of patients (75%). Thrombocytopenia was seen in 22 patients (91.6%).

SGOT and/or SGPT were elevated in 20 patients (83.33%). Raised bilirubin (>1.2 mg/dl) was found in 7 patients and renal failure (creatinine > 1.5 mg/dl) in 15 patients.

**Table-2: Laboratory investigations**

Investigation	Number*	Percentage
TLC<4000	02/24	8.3
TLC 4000-1000	18/24	75
TLC>11000	04/24	16.6
Platelet>1.5 LAC	02/24	8.3
Platelet<1 LAC	22/24	91.6
Increased SGOT/PT	20/24	83.3
Increased alkaline phosphatase	14/24	58.3
Increased creatinine	15/24	62.5
Increased bilirubin	7/24	29.16

\*Indicates the number of patients in whom particular investigation was done.

TLC: Total leucocytes count Table 3, shows the complications of scrub typhus. Table 4, shows the salient features of four patients who had multisystem involvement. Leucocytosis was present in two out of the four patients. Acute respiratory distress syndrome

(ARDS) was present in all four of these patients. These patients had significant breathlessness with respiratory rate >30/min. Two patients had shock requiring inotropes and two other patients had hypotension that improved with fluids. Three patients

had features of meningitis with cerebrospinal fluid (CSF) showing elevated protein and/or lymphocytic pleocytosis. The duration of fever in those with meningitis ranged from 3 to 20 days. CSF analysis

was done in three patients. Two patients had elevated protein alone without pleocytosis. One patient had lymphocytic pleocytosis with elevated protein. Two patients had large lymph nodes.

**Table-3: Complications of scrub typhus**

Complications	Number	Percentage
ARDS	4	16.6
Shock	2	8.33
Meningitis	3	12.5
Renal impairment	6	41.4
Bilirubin>1.2medl	10	25
Thrombocytopenia	22	8.33
Lymph node enlargement	2	91.6

**ARDS: Acute respiratory distress syndrome**

**Table 4: Salient features of patients with multisystem involvement**

.Age/se	TLC	Shock	ARDS	ARF	Platelet count	Meningitis	Others
20/F	18000		P	P	85000	P	
72/M	4000	P	P		1.5 lac	P	
25/F	7000	P	P		60000		
28/M	11500		P	P	1.6 lac	P	LN's enlarged

F:female, M: Male, P: Present. TLC: Total leucocyte count, ARF: Acute renal failure, ARDS: Acute respiratory distress syndrome

**DISCUSSION**

In our series of patients, most of the patients presented with non-specific symptoms and signs of bilateral lower zone pneumonitis with hemoptysis. Unlike the usual viral illnesses, the duration of fever in the majority of cases was more than 7 days. In addition, chest X-ray showing infiltrates in the lower zones bilaterally was also an important finding.

The patients either belonged to or resided in Kota, Bundi, Jhalawar, Baran, Chittorgarh, Bhilwara, Tonk, Sawaimadhopur districts and districts of M.P... These are areas of heavy vegetation in Rajasthan.

In scrub typhus, usually an eschar of approximately 5-30 mm in diameter is formed at the site bitten by trombiculid mites and this may be considered the most important clinical finding for the diagnosis of scrub typhus [7]. In present study 6 patients (25%) presented with eshar. This is in concordance with few reports from India in which very few patients were reported to have eschar [5,8]. But eschar was found in 46% and 60% of patients reported from studies done in South Vietnam and Taiwan, respectively [9,10]. [Table 5]. Eschar is usually associated with regional lymphadenopathy and sometimes generalised lymphadenopathy.

Among the laboratory parameters the most consistent abnormality noticed was elevation of liver enzymes which was present in 83.33% of the cases [Table 2]. Similar abnormalities have been observed in other studies also [4,11].

16.66% (4/24) of our patients had multisystem involvement [Table 4]. These patients presented with significant breathlessness and four of these had evidence of ARDS with diffuse infiltrates in the chest X- ray. Renal function impairment was seen in 15 patients and 7 patients had clinical jaundice with bilirubin values more than 2.5 mg/dl. Table 5, shows the comparison of clinical features of present study with other reported studies.If a combination of elevated transaminases, thrombocytopenia and leukocytosis is used, the specificity and positive predictive value for diagnosis of scrub typhus are about 80%[12] in the study also majority of the patients had thrombocytopenia but not less than 50, 000/ml count, however, elevated TLC was not an usual phenomenon.

It is noteworthy that the serological tests for Rickettsial diseases including the specific IgM antibody tests become positive only in the second week and a second sample at a later time is often required, serological tests cannot provide early diagnosis and a specific diagnosis may not be available until after the patient has died or recovered[13]. In this study, duration of illness was considered as per history of duration of fever. Most of the patients were diagnosed in second week or in later part of the illness, however few patients were also detected in the end of first week of illness (i.e., 5th or 6th day), as per history. But as most of the patients belonged to rural areas and were generally uneducated, the correct duration of illness cannot be guaranteed.

Doxycycline 200 mg/day is the treatment of choice for scrub typhus. Other useful antibiotics are chloramphenicol, azithromycin and rifampicin. Rapid resolution of fever following doxycycline is so characteristic that it can be used as a therapeutic test.[1] Nearly all the cases responded dramatically to doxycycline, with resolution of symptoms within 3-4 days.

This study report emphasizes the need for increased awareness of rickettsial infections in rural areas of Rajasthan, western India. Because of current circumstances in India, we suggest that the diagnosis of scrub typhus should be largely based on a high index of suspicion and careful clinical, laboratory and epidemiological evaluation. Use of empiric treatment should also be considered to reduce the high mortality observed with the disease.

**Table 5: Comparison of clinical features in various studies**

Parameters	Vellore	Shimla	South Vietnam	Pondichery [14]	Jaipur	Kota, present study
Duration of study	5 months	-	-	2 years	3	2 months
No. of cases	27	21	87	50	42	24
No. of days of fever	5-20	5-25	NA	3-60	4-30	4-30
Myalgia (%)	52	38	32	38	47.60	45.83%
Cough	44%	NA	45%	40%	14.20%	100%
Nausea/vomiting (%,/o)	48	43	28	58	40.40	37.5%
Lymphadenopathy	NA	53%	85%	30%	2.46%	8.33%
Hepatomegaly	NA	43%	43%	28%		62.50%
Jaundice	26%	53%	NA	10%	40.4%	41.4%
Altered sensorium	19%	24%	NA	20%		20.8%
Macular rash (%)	22	10	34	14	2.38	12.5%
Eschar	4%	10%	46%	46%	None	25%
Mortality	11.10%	14.20%	NA	2%		16.66%

**CONCLUSIONS**

Scrub typhus is very much prevalent in Rajasthan. It should be considered in the differential diagnosis of patients with acute febrile illnesses, including those with renal impairment, LFT abnormalities, altered sensorial, pneumonitis or ARDS. A thorough and probing search for an eschar, particularly in the hidden areas is very useful for diagnosis. However, the eschar may not be present in a large number of cases. Empirical therapy with doxycycline may be life saving when clinical suspicion is high.

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