

## Original Research Article

# Clinical and demographic study of scrub typhus in a tertiary care teaching hospital in Puducherry during 2015-2018

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### ABSTRACT

**Background:** Scrub typhus is a vector borne rickettsial disease commonly found in many parts of India. Scrub typhus can frequently cause complications like pneumonia, acute respiratory distress syndrome (ARDS) and has a mortality rate of 30 to 45% in untreated cases. Diagnosis of scrub typhus is difficult, with serum IgM capture ELISA being the most sensitive test. Present study objectives were to study the clinical and demographic profiles of scrub typhus cases in a tertiary care teaching hospital in the Union Territory of Puducherry, India.

**Methods:** A descriptive study was carried out to analyze clinical and demographic profiles of patients who were positive for IgM antibodies against *Orientia tsutsugamushi* by scrub typhus IgM ELISA during a three year period (April 2015 to March 2018). Demographic details like age and sex of the patients, clinical signs, symptoms and complication if any were analyzed.

**Results:** A total of 428 patients were found to have been diagnosed with scrub typhus during the study period. Among them, 46% were males and 54% were females. Among all the positive cases, 23.5% were paediatric cases, the second highest group was the 31 to 40 years age group (17.7%). Thirteen percent of positive cases were above 60 years of age. Fever was the most common symptom (92.9%) and eschar was found in 22.9% of patients. The most common complication found in the patients with scrub typhus was acute respiratory distress syndrome (15.9%). Other complications like hepatic dysfunction, pleural effusion and meningoencephalitis were noted.

**Conclusions:** Adequate knowledge about scrub typhus helps in early diagnosis, which facilitates early appropriate antibiotic and supportive therapy, which helps in the recovery of the patient without acquiring complications.

**Keywords:** Clinical features, IgM scrub ELISA, *Orientia tsutsugamushi*, Scrub typhus

### INTRODUCTION

Scrub typhus is a vector borne, zoonotic bacterial infection caused by *Orientia tsutsugamushi*. It is a re-emerging infection, found in the 'tsutsugamushi triangle' of South and Southeast Asia, the Asian Pacific rim and Northern Australia.<sup>1,2</sup> It is one of the commonly occurring rickettsial disease in India, and it has been reported from Maharashtra, Tamil Nadu, Karnataka, Kerala, Jammu and

Kashmir, Uttaranchal, Himachal Pradesh, Rajasthan, Assam, Puducherry and West Bengal.<sup>1-3</sup>

The disease is transmitted by the bite of chiggers of some species of trombiculid mite.<sup>1</sup> The incubation period is usually 10-12 days after which symptoms like fever, severe headache, and myalgia develop.<sup>2</sup> A necrotic 'eschar' develops at the chigger bite site, however it is not found in all the scrub typhus cases.<sup>2</sup> Other signs and

symptoms include rash, lymphadenopathy, hepatosplenomegaly, cough, sore throat, abdominal pain and central nervous system involvement.<sup>4</sup>

Clinical manifestations can range from sub-clinical infection to complications like, renal failure, pneumonitis, acute respiratory distress syndrome (ARDS), septic shock, meningoencephalitis, multi organ failure and death in untreated or improperly treated cases.<sup>2</sup>

In children, it presents as an acute febrile illness and the severity varies among patients.<sup>5</sup> Effective management and early administration of antibiotics will help to prevent the complications and mortality associated with scrub typhus and to achieve this, scrub typhus has to be diagnosed early, differentiated from malaria, dengue, leptospirosis and enteric fever, and treated appropriately.<sup>2</sup>

Incidence of scrub typhus has shown an increasing trend in the Union Territory of Puducherry, with varying clinical manifestations.<sup>6</sup> Data about this disease in this part of India will help create awareness about the presence of the disease, which in turn will help in early suspicion, diagnosis and treatment. This study aims to analyze about the clinical and demographic profiles of scrub typhus cases in a tertiary care teaching hospital in the Union Territory of Puducherry, India, during a period of three years (April 2015 to March 2018). Data obtained will help in improving the diagnostic capacity and management of such cases.

## METHODS

This descriptive study was carried out on all serologically confirmed 428 cases of scrub typhus, admitted in a tertiary care teaching hospital during a three year period from April 2015 to March 2018. All serologically confirmed (anti *O. tsutsugamushi* IgM antibody positive) scrub typhus cases admitted in the hospital during the study period were included in the study.

Commercially available ELISA kit (Inbios International Inc. Seattle, USA), which utilizes recombinant 56kDa antigen of *O. tsutsugamushi* was used for detecting anti *O. tsutsugamushi* IgM antibodies. An O. D value of the sample more than the cut-off (as per kit insert) was considered as positive for IgM antibodies.

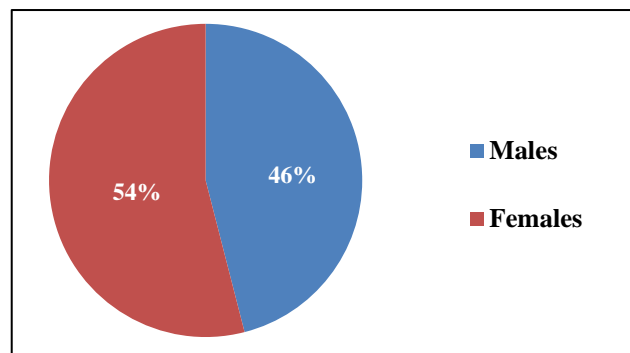
Data of all the 428 patients who were confirmed positive for scrub typhus during the study period was obtained from hospital information system and the medical records department. The medical records were analyzed for demographic details which included age and sex of the patients. The sex wise distribution of patients with scrub typhus was calculated and expressed in percentages. Patients were grouped into age groups of 1-14 years (paediatric group), 15 to 20 years, 21 to 30 years, 31 to 40 years, 41 to 50 years, 51 to 60 years, 61 to 70 years, 71 to 80 years and 81 to 90 years, and the percentage of

people in each age group who were positive for scrub typhus was calculated and expressed in percentages.

Data regarding clinical signs, symptoms and complication if any were also analyzed. The clinical presentations were grouped into signs and symptoms like fever, eschar, rigor, vomiting, cough, chills, headache, skin rash, abdominal pain, seizure, myalgia, arthralgia, oliguria, hepatomegaly, splenomegaly, lymphadenopathy, thrombocytopenia and complications like hepatic dysfunction, hepatorenal failure, pleural effusion, acute respiratory distress syndrome (ARDS), multiple organ dysfunction syndrome (MODS), meningitis, meningoencephalitis, myocarditis, cholangitis and perinephric effusion. Co - infections and mortality if any were also documented. The number of patient exhibiting these signs, symptoms and complications were calculated. All the data were expressed in numbers and/or percentages.

## RESULTS

A total of 428 patients were serologically diagnosed to have scrub typhus during the study period of three years. Among the 428 patients, 199 (46%) were males and 229 (54%) were females. Figure 1 shows the sex wise distribution of patients with scrub typhus. Numbers of females were more than the male patients.



**Figure 1: Sex wise distribution of patients with scrub typhus.**

Among all the positive cases, 101 (23.5%) of them were paediatric cases which was the highest among all the age groups. The 31 to 40 years age group had 76 (17.7%) cases which was the second highest group. In the other age groups, 5.3% of patients were in the 15 to 20 years group, 15.6% in the 21 to 30 years group, 13.7% in the 41 to 50 years group, 10.7% in the 51 to 60 years group, 9.3% in the 61 to 70 years group, 3.2% in the 71 to 80 years group and 0.4% in the 81 to 90 years group. Table 1 shows age wise distribution of patients with scrub typhus.

Among the signs and symptoms exhibited by the patients with scrub typhus, fever was the most common symptom (92.9%). Chills (50.3%), headache (42.6%), vomiting

(36.3%), rigor (35.6%) and myalgia (33.7%) were the other common, associated clinical features.

**Table 1: Age wise distribution of patients with scrub typhus.**

Age groups	Percentage (n=428)
1 to 14 years	23.5%
15 to 20 years	5.3%
21 to 30 years	15.6%
31 to 40 years	17.7%
41 to 50 years	13.7%
51 to 60 years	10.7%
61 to 70 years	9.3%
71 to 80 years	3.2%
81 to 90 years	0.4%

Eschar, considered to be a common feature in scrub typhus, was found only in 22.9% of patients. Other signs and symptoms like cough were found in 22.2% of the patients, skin rash in 10.1%, abdominal pain in 24.2%, seizure in 3.1%, arthralgia in 8.2%, oliguria in 1.2%, hepatomegaly in 10.1%, splenomegaly in 7%, lymphadenopathy in 19.7% and thrombocytopenia in 28% of the patients. Table 2 shows the clinical features of the patients diagnosed with scrub typhus.

**Table 2: Clinical features of the patients diagnosed with scrub typhus.**

Clinical features	Percentage
Fever	92.9%
Eschar	22.9%
Rigor	35.6%
Vomiting	36.3%
Cough	22.2%
Chills	50.3%
Headache	42.6%
Skin rash	10.1%
Abdominal pain	24.2%
Seizure	3.1%
Myalgia	33.7%
Arthralgia	8.2%
Oliguria	1.2%
Hepatomegaly	10.1%
Splenomegaly	7.0%
Lymphadenopathy	19.7%
Thrombocytopenia	28.0%

Some of the scrub typhus positive patients developed complications. The most common complication found in the patients with scrub typhus was acute respiratory distress syndrome (15.9%). Hepatic dysfunction (7%) and meningitis (6.3%) were the other common complications found in scrub typhus patients. Hepatorenal failure was found in 1.2% of patients, pleural effusion in 4.4%, multiple organ dysfunction syndrome in 0.6%, meningoencephalitis in 3.8%, cholangitis in 0.6% and

perinephric effusion in 1.2% of the patients. Co-infections with other etiological agents were found in 17.1% of patients. Enteric fever, urinary tract infections, cystitis, malaria, pulmonary tuberculosis and H1N1 infection were some of the co infection found in these patients. Table 3 shows the various complications seen in the scrub typhus positive patients.

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

Complications	Percentage
Hepatic dysfunction	7.0%
Hepatorenal failure	1.2%
Pleural effusion	4.4%
Acute respiratory distress syndrome	15.9%
Multiple organ dysfunction syndrome	0.6%
Meningitis	6.3%
Meningoencephalitis	3.8%
Cholangitis	0.6%
Perinephric effusion	1.2%
Co infections	17.1%

## DISCUSSION

The incidence of scrub typhus has been increasing in India. The improved laboratory diagnostic methods like IgM scrub ELISA and PCR and the awareness about the disease, has led to improved diagnosis and reporting.<sup>7</sup> This is evident from the fact that a total of 428 positive cases of scrub typhus have been reported in this present study, in a three year period, whereas in a study by Vivekanandan et al.<sup>8</sup> it was only 50 cases which were reported positive during a two year period from the same centre eight years back in the year 2010.<sup>8</sup> This can be in part attributed to the switch over from non specific test like the Weil-Felix test to more specific and sensitive scrub typhus IgM ELISA assay.

In the present study, the percentage of female patients were higher (54%), than the males (46%) and this trend has also been reported in some of the earlier studies.<sup>5,8</sup> However Saha et al reported more number of positive male patients in their study.<sup>3</sup> Paediatric age group was the most affected with 101 cases (23.5%), which shows the higher incidence of scrub typhus in children.

Patients with scrub typhus have fever, headache and myalgia as the most common clinical presentations.<sup>6</sup> Patients can also present with other nonspecific symptoms, which often leads to a dilemma in diagnosis.<sup>6</sup>

In this study, majority of the patients presented with fever (92.9%) which was the most common symptom, followed by chills, vomiting, rigor and myalgia. However, 7.1% of the patients who had scrub typhus, did not have fever when they presented to the tertiary care centre. This may be due to the antibiotic therapy received elsewhere, which was however not sufficient to clear the infection. Non specific symptoms associated with the respiratory

tract like cough (22.2%) and symptoms of the gastro intestinal tract like abdominal pain (24.2%) were also seen in patients.

Eschar, a black necrotic lesion found at the site of attachment of the chigger, is one of the characteristic features of scrub typhus. However, eschar is not seen in all the patients. A study by Vivekanandan et al, found eschar in only 46% of patients with scrub typhus, whereas a study by Patricia et al, reported eschar in 21%.<sup>6,8</sup> In this present study, eschar was found in 22.9% of the patients, correlating with findings of Patricia et al.<sup>6</sup> Thrombocytopenia, was observed in 28% of the patients which was comparable with the reports by Stephen S et al.<sup>9</sup>

Scrub typhus can produce severe complications, especially when the diagnosis and treatment is delayed.<sup>8</sup> Acute respiratory distress syndrome (ARDS) was the most common complication reported in this study. A previous study by Vivekanandan et al, reported ARDS in 8% of the patients<sup>8</sup>

Central nervous system complication like meningitis, meningoencephalitis, other systemic complications like hepatic dysfunction and pleural effusion were also found among the patients in this study showing the serious nature of this infection. Some patients also presented with co infections like enteric fever, which complicates the diagnosis and treatment.

Scrub typhus is an emerging infectious disease, with cases reported from all over India. The union Territory of Puducherry has been described as an endemic zone and outbreaks have been reported during the last few years.<sup>10</sup> Lack of adequate knowledge about the prevalence of the disease and the non specific presentation of the disease makes the diagnosis complicated. Serious complications caused by the disease increases the morbidity and mortality rate. This study attempts to provide inputs regarding the demographic and clinical profiles of patients with scrub typhus, which will help in diagnosis and management.

## CONCLUSION

Knowledge and awareness about the disease makes the diagnosis simple and fast, which in turn facilitates early appropriate antibiotic and supportive therapy, which helps in the recovery of the patient without acquiring complications.

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