

Original Research Article

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## An Outbreak Study of Scrub Typhus in Latehar District of Jharkhand

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### ABSTRACT

#### Keywords

Scrub typhus, fever, eschar, mite

#### Article Info

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Scrub typhus, a zoonotic disease has become a public health problem in many parts of world. It is an arthropod borne gram-negative obligate intracellular bacillus *Orientia tsutsugamushi*. The main objective of this study a recent outbreak of scrub typhus from Barwadih block of Latehar district, of Jharkhand. Materials and Methods: Samples of clinically suspected cases of scrub typhus (collected by both active and passive surveillance), were tested by IgM ELISA and also Real Time PCR in the Department of Microbiology, RIMS, Ranchi. During the study period, a total of 67 samples from clinically suspected cases of scrub typhus were tested, out of which 16 samples were positive. The increase in scrub typhus infection, prompts us for a better prevention and management of the disease, so as to combat the complications caused by scrub typhus.

### Introduction

Scrub typhus, also known as tsutsugamushi disease, is caused by the arthropod borne gram-negative obligate intracellular bacillus *Orientia tsutsugamushi* (Valbuena and Walker, 2013; Kim and Walker, 2011; Paris *et al.*, 2013) and is transmitted by the larval stage of mites (“chiggers”) in the family Trombiculidae. Historically, scrub typhus had been endemic in Asia, Australia and islands in the Indian and Pacific Oceans, known as the “tsutsugamushi triangle”. (Bonell *et al.*, 2017) The infection may be acquired in both rural and semi-urban environments and thus an enormous human population is likely to be at risk. In some

areas of Southeast Asia, scrub typhus causes up to 23% of febrile hospital admissions (Phongmany *et al.*, 2006; Brown *et al.*, 1976; Mayxay *et al.*, 2013 and Manosroi *et al.*, 2006). There has been an upturn in the cases of scrub typhus across India in the recent years; and scrub typhus has re-emerged as a major cause of acute undifferentiated febrile illnesses (AUF) with high morbidity and mortality (Kispotta *et al.*, 2020 and Varghese *et al.*, 2014). In some areas of Southeast Asia, scrub typhus causes up to 23% of febrile hospital admissions (Phongmany *et al.*, 2006; Brown *et al.*, 1976; Mayxay *et al.*, 2013 and Manosroi *et al.*, 2006). The clinical presentation of scrub typhus ranges from subclinical disease to multiorgan failure and death.

(Sankhyan *et al.*, 2014) The disease usually presents with fever, diffuse lymphadenopathy, myalgia, rash, jaundice, thrombocytopenia, capillary leak syndrome, hepatomegaly, and splenomegaly (Sankhyan *et al.*, 2014). The pathognomonic feature of scrub typhus is the necrotic eschar at the bite site.

The disease can progress to severe complications like acute respiratory distress syndrome (ARDS), hepatitis, acute kidney injury, myocarditis leading to heart failure, and meningoencephalitis in different proportions of the patients. A late presentation, delay in diagnosis and treatment, and varying levels of antibiotic resistance exhibited by the organism are factors responsible for high mortality (Varghese *et al.*, 2013). During the past few years, the number of patients with rickettsial infection and scrub typhus has increased, especially during the second half of the year.

The main objective of this study a recent outbreak of scrub typhus from Barwadih block of Latehar district, of Jharkhand.

### **Case definition of scrub typhus**

A probable case# laboratory-confirmed by any one of the following assays:

A case is one in which IgM ELISA is positive for scrub typhus

*O. Tsutsugamushi* DNA is detected in eschar samples or whole blood by PCR

Seroconversion or four fold rise or fall in antibody titres in paired sera detected by Indirect Immune Fluorescence Assay (IFA) or Indirect Immunoperoxidase Assay (IPA) or ELISA

Clinical case of Scrub Typhus is defined as: Acute undifferentiated febrile illness of 5 days or more with or without eschar should be suspected as a case of Rickettsial infection. (If eschar is present, fever of less than 5 days duration should be considered as scrub typhus). Other presenting features may be

headache and rash, lymphadenopathy, multi-organ involvement like liver, lung and kidney involvement. The differential diagnosis of dengue, malaria, pneumonia, leptospirosis and typhoid should be kept in mind.

### **Materials and Methods**

51 serum samples were submitted to Department of Microbiology, RIMS, Ranchi through passive surveillance from patients clinically diagnosed with Scrub Typhus infection.

After this, active surveillance was carried out in the same area and 16 samples were collected from patients with clinical presentation of Scrub Typhus. For scrub typhus, ELISA for IgM antibody was carried out using Scrub Typhus Detect IgM ELISA (InBios International, Inc. U.S.A.) following the manufacturer's instructions.

The *Orientia tsutsugamushi* Detect IgM ELISA is an ELISA system for the detection of IgM antibodies in human serum to OT derived recombinant antigen. The Scrub typhus Detect IgM ELISA system is a qualitative ELISA for the detection of IgM antibodies to *O. tsutsugamushi* in serum. Wells of each plate are coated with unique recombinant antigen mix. The absorbance was read at 450 nm and an optical density of > 0.5 was considered positive.

A Real -Time PCR was also performed for scrub typhus.

### **Results and Discussion**

The Real – Time PCR result for all the samples were negative. Although the true diagnostic accuracy of PCR is superior to all other modalities for the diagnosis of scrub typhus in the early disease course, this method is limited to the bacteremic dissemination phase. In the present study, the most common age group affected was 11-20 years followed by 21-30 years. Most common presenting symptom was fever with chills and rigor followed

by cough, myalgia and vomiting. Eschar, was found in only 2 cases (12.5%). This was higher than a previous study from the Himalayan region (9.5% patients), but lesser than that reported from south India (43.5%) and Jeju Island in South Korea (75.8%) (Griffith *et al.*, 2014; Mahajan *et al.*, 2006 and Yoo *et al.*, 2014).

Socioeconomic status and occupation are important risk factors for scrub typhus. Most scrub typhus patients in India are uneducated and live in rural areas (Lim *et al.*, 2015 and Mittal *et al.*, 2012).

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.

In the present study, after the samples tested positive, an active surveillance was carried out. The area where outbreak of scrub typhus occurred was covered with dense vegetation, which is a favourable habitat for the mite. The patients already showing fever were started on antibiotic doxycycline. Doxycycline can be used in persons of any age.

Antibiotics are most effective if given soon after symptoms begin. People who are treated early with doxycycline usually recover quickly. Currently, no vaccine is available to prevent scrub typhus. We can reduce our risk of getting scrub typhus by avoiding

contact with infected chiggers. When travelling to areas where scrub typhus is common, avoid areas with lots of vegetation and brush where chiggers may be found (Centre for Disease Control and Prevention).

Scrub typhus can occur in areas where scrub vegetation consisting of low lying trees and bushes is encountered, and also in habitats as diverse as banks of rivers, rice fields, poorly maintained kitchen gardens (Mittal *et al.*, 2012), grassy lawns which can all be inhabited by chiggers (Wei *et al.*, 2006-2012). The chiggers feed usually on rodents and accidentally on humans, and transmit the infection during the prolonged feeding which can last for 1-3 days. The cases which occurred in our study were also exposed to rodents inhabiting the houses this particular village. Scrub typhus disease is seasonal, which correlates with the appearance and activity of mites.

Prevention from the chigger bites can be ascertained by personal prophylactic measures, environmental management, community awareness and chemical control in the areas of heavy infestations of the chiggers.

Scrub typhus is still an under-diagnosed disease in India. Arthropod-borne diseases are well known for their negative impacts on humans and animal health in India. The reason lies in several factors which include global warming, environmental and ecological changes, and availability of suitable habitats.

**Table.1** Details of samples tested at our centre

Number of samples tested from clinically diagnosed patients	Number of samples tested positive
67	16

Out of a total of 67 samples tested, 16 samples were positive for Scrub typhus.

**Table.2** Gender distribution of cases

Gender	Clinically diagnosed cases	Tested positive
Male	33	9
Female	34	7

Clinically as well as after performing laboratory investigation, there was not major difference in the gender affected more.

**Table.3** Age –wise distribution of positive cases

Age group (years)	Number of cases
0-10	1
11-20	6
21-30	5
31-40	2
41-50	2

The most common age group affected was 11-20 years followed by 21-30 years.

**Table.4** Symptoms presented by patients

Symptoms	Number of positive tested patients
High-grade fever with chills and rigor	16
Abdominal pain	8
Vomiting	12
Cough	12
Diarrhoea	5
Shortness of breath	5
Jaundice	8
Altered sensorium	4
Myalgia	12
Eschar	2

Most common presenting symptom was fever with chills and rigor followed by cough, myalgia and vomiting. Eschar , was found in only 2 cases (12.5%).

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