

Clinical and Demographic Characteristics of the Autumn-winter Type of Scrub Typhus Cases in a Peripheral Medical College of West Bengal, India

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ABSTRACT

Introduction: Scrub typhus is a vector-borne zoonotic disease caused by *Orientia tsutsugamushi*, obligate intracellular gram negative bacteria. It is transmitted by the larval stage of mites (“chiggers”) in the family Trombiculidae. The disease is endemic in many parts of India and continues to be a public health problem.

Aim: To study the clinical and demographic characteristics of the scrub typhus patients in a peripheral medical college of West Bengal, India.

Materials and Methods: Present study was a retrospective study enrolling 66 confirmed positive cases with Enzyme Linked Immunosorbent Assay (ELISA) test during the period from 1st September 2021 to 31st December 2021 at Department of Microbiology, Rampurhat Government Medical College and Hospital, Rampurhat, West Bengal, India.

Results: The clinical and demographic characteristics of the scrub typhus patients’ majority were below age of 15 years i.e. (72.7%), in which females (65.2%) were more compared to male (34%). Most of the study participants were from rural area (76.8%). Majority of study subjects presented with fever (94%), fever with chills (36.4%), cough (24.2%), altered sensorium (25.8%). Maximum cases 42 (63.6%) had occurred in the month of September followed by 11 (16.7%) in October, and November and 02 (3.0%) case reported in December 2021. About 15.3% study population had expired where as 84.7% survived.

Conclusion: Current study shows that majority of the cases occurred in the month of September 2021 with female preponderance. Most of the residents were from rural areas with common clinical symptoms with fever with or without chills and breathlessness, headache, altered sensorium and skin lesions.

Keywords: Acute febrile illness, Chiggers, Skin lesions

INTRODUCTION

Scrub typhus is a vector-borne zoonotic disease caused by *Orientia tsutsugamushi* an obligate intracellular gramnegative bacterium [1]. It is transmitted by the larval stage of mites (“chiggers”) in the family Trombiculidae. Before 1986, scrub typhus was only found endemic in southern China. Because human infections typically occur in the summer, it is called “summer type”. During the autumn-winter period of 1986 in northern China, a novel type of scrub typhus was identified in Shandong and northern Jiangsu. It was then spread in many areas of northern China (then called “autumn-winter type”). The scrub typhus of autumn-winter type was seen exclusively from September to December with highest in October, which was unlike from the summer type in southern China [2].

Orientia tsutsugamushi is the virulent strain of autumn-winter type scrub typhus, transmitted by a mite called *L. scutellare*. The so-called ‘tsutsugamushi triangle’ region extends from Japan-Russia in the North, to Australia in the south, and to Pakistan in the west. Various countries included in this triangle are Japan, China, Philippines and Southeast Asia including India [3-5]. The disease has become a significant occupational hazard in rural workers, adults involved in agriculture, forest occupation, and in those persons residing close to bushes and wood piles [5]. Though it is mainly reported from rural areas, however recently cases have been increasingly reported from urban areas also [6].

Acute Febrile Illness (AFI) is one of the most common presenting cases in the emergency and outpatient clinics in developing countries. Outbreak of AFI occurs usually in post-rainy season/ autumn-winter period in India and in recent years, scrub typhus

has rapidly remerged to become the major cause of AFI in many parts of India [7]. Clinical spectrum varies from self-limiting febrile illness to multiorgan failure resulting to death. Early diagnosis and proper management is therefore very essential. Incubation period varies from 7-21 days. Patients with scrub typhus often present with fever, headache, myalgia, rash and lymphadenopathy, which are also seen in other febrile illness as well. An eschar is being formed which a characteristic skin lesion is usually observed in most of the scrub typhus patients that is useful to the doctor for making the diagnosis. Severe complications include prominent encephalitis, interstitial pneumonia and Acute Respiratory Distress Syndrome (ARDS), circulatory collapse with haemorrhagic features [8,9].

As this was a new medical college established in part of the rural area of West Bengal and no previous data were obtained in this area, so this study was conducted to study the clinical and demographic characteristics of the scrub typhus patients in a peripheral medical college of West Bengal, India.

MATERIALS AND METHODS

The present study was a retrospective study which was conducted at Department of Microbiology, Rampurhat Government Medical College and Hospital, West Bengal, India on the records collected in December 2020 to April 2021 and it was then analysed in 1st September 2021 to 31st December 2021. Study was done on all the patients those were confirmed positive cases of Scrub Typhus by ELISA admitted in medicine/pediatrics ward. An informed consent was obtained from the patients before conducting the study. An Institute Ethical Clearance (IEC) was obtained from the Institute (Reg no. ECR/1438/Inst/WB/2020 on 18.08.2020).

Methodology: All the patients admitted in the medicine/paediatrics ward who's IgM was positive with ELISA for scrub typhus. The patients were classified based on the Epidemiology and Disease Control Division (EDCD) Guideline on Prevention and Control of scrub typhus adopted from the World Health Organisation (WHO) [10].

Case Definition

Suspected/clinical case: Acute Undifferentiated Febrile Illness (UFI) of five days or more with or without eschar is considered as a case of Rickettsial infection. (If eschar is present, fever of less than five days' duration should be considered as scrub typhus). A suspected clinical case with an IgM titer >1:32 and/or a four-fold increase of titers between two sera is confirmed as a recent infection [10].

Procedure

Serum samples were collected and scrub typhus was diagnosed with ELISA (Scrub Typhus Detect™ IgM ELISA quick instruction card manufactured by in Bios, International, Inc.) as per the manufacturer's instructions and an Optical Density (OD) >0.5 was considered positive. Overall data were collected regarding demographic profile, clinical history, and laboratory parameters from patient's records.

STATISTICAL ANALYSIS

Data has been presented in the form of tables and diagrams by using descriptive statistics in percentages, frequencies etc. Data has been compiled in MS excel sheet 2013 and analysed using Statistical Package for the Social Sciences (SPSS) version 20.0.

RESULTS

Out of 66 scrub typhus subjects, 48 (72.7%), were below age of 15 years including both females (43, 65.2%) and male (23, 34.8%) shown in [Table/Fig-1]. Most of the study participants were from rural area (50, 75.8%). Majority study subjects presented with fever (94%), fever with chills (36.4%), breathlessness (18.2%), cough (24.2%), altered sensorium (26.8%), vomiting and nausea (4.5%), headache (18.2%), Gastrointestinal symptoms (18.2%), other clinical

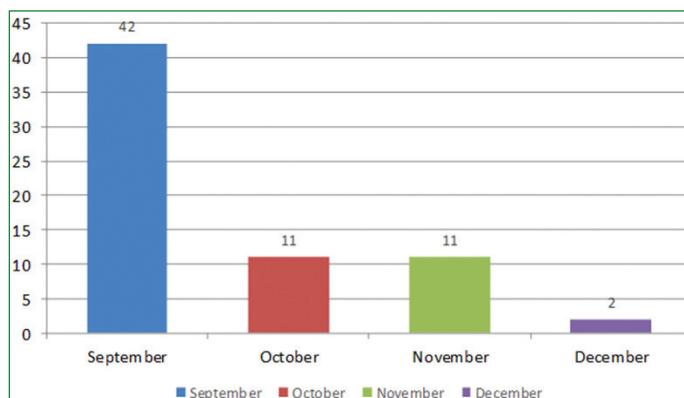
Demography	N (%)
Age (in years)	
<15	48 (72.7)
≥15	18 (27.3)
Gender	
Male	23 (34.8)
Female	43 (65.2)
Locality	
Rural	50 (75.8)
Urban	16 (24.2)
Clinical profile	
Fever	62 (94)
Fever with chills	24 (36.4)
Breathlessness	12 (18.2)
Cough	16 (24.2)
Altered sensorium	17 (25.8)
Vomiting and nausea	3 (4.5)
Headache	12 (18.2)
Gastrointestinal symptoms	12 (18.2)
Skin lesion (Eschar)	5 (7.6)
Seizure	7 (10.6)
Conjunctival congestion	21 (31.8)

[Table/Fig-1]: Demography and clinical profile of scrub typhus subjects (N=66).

features is shown in [Table/Fig-1]. The most common laboratory finding was altered hepatic function in 63.6%, thrombocytopenia was markedly high in 91% patients [Table/Fig-2]. The maximum burden of cases were found in the month of September (42/66, 63.6%) [Table/Fig-3].

Laboratory parameters	No. of patients (%)
SGOT/SGPT (≥2 times normal)	42 (63.6)
Thrombocytopenia (<1.0×10 ⁹ /μL)	60 (91)
Hyperbilirubinemia (>2.5 mg/dL)	39 (59.1)
Anaemia (<11 g/dL)	44 (66.7)
Hypoalbuminemia (<3 g/dL)	22 (33.3)
Raised creatininie (≥1.5 mg/dL)	38 (57.6)

[Table/Fig-2]: Laboratory parameters of 66 scrub typhus patients (N=66)
SGOT/SGPT: Serum glutamic oxaloacetic transaminase/Serum glutamic pyruvic transaminase



[Table/Fig-3]: Month wise distribution of study subjects (N=66).

DISCUSSION

Scrub typhus is an infective vasculitic-perivasculitic disease caused by *Orientia tsutsugamushi*. This infection is known to occur in diverse geographical places like rice-fields, deserts, and seashores. In India, this disease was documented for the first time during the World War II among field troops in Assam and West Bengal. Since then, a pan India presence of this disease has been well-documented predominantly from South India and the Himalayan region of North India [11]. In this present study, a definitive exposure to scrub vegetation was seen and a changing epidemiological trend that needs to be studied further for the effect of the environment on the dispersion of both the scrub vegetation and vector biology related to trombiculid mites in North India. In a previous study from South Korea, behavioural factors that may have a bearing on scrub typhus were urinating or squatting for defecating directly on grasses and working with bare hands and short sleeves [12].

In present study, majority (72.7%) were below the age group of 15 years which was similar to the study by Takhar RP et al., [13]. In the present study majority of the subjects (75.8%) were from rural areas. This is in congruence with data which was published by the Indian Council of Medical Research (ICMR) and also with study done by Saha B et al., [14,15]. Scrub typhus outbreak had occurred from September to December, 2021. The maximum burden of cases being in the month of September, which correlates with other studies as well [16,17]. Similar study findings were seen by Khan F et al., with highest prevalence (65%) in August [18]. Various other study showed that maximum scrub typhus prevalence was in the month of September [18-21] [Table/Fig-4].

In this study, subjects presented with fever 94%, fever with chills 36.4%, altered sensorium 26.3%, gastrointestinal symptoms 18.2%, skin lesion (eschar) 7.6%. This highlights the fact that febrile patients of scrub typhus can also present with various prominent gastrointestinal symptoms. Skin lesion particularly

Author name (Reference no.)	Place	Year of publication	Scrub typhus prevalence
Khan F et al., [18]	Uttarakhand region, India	2015	August 65%
Gujar VM et al., [19]	Maharashtra, India	2019	September- 32.8%
Gupta N et al., [20]	New Delhi	2016	September- 88%
Lalrinkima H et al., [21]	Mizoram	2017	Winter- 13.5%
Present study	West Bengal, India	2022	September- 63.6%

[Table/Fig-4]: Month wise data found in previous studies.

eschar formation is considered most useful diagnostic clues for scrub typhus was present in only 7.6% cases of present study. However, its prevalence varies from 10-70% in various studies [22,23].

This variation in the presence of eschar formation may be explained by the geographic distribution of different strains of the organism. The eschar distribution on body surface might be associated with cloth type and personal hygiene, as the two factors affect how and where chiggers entered and stayed on the body surface [24,25]. The most common laboratory finding was altered hepatic function in 63.6%, thrombocytopenia was markedly high in 91% patients which shows similarity with many previous studies in India [26]; hyperbilirubinemia was present in 59.1% cases, anaemia in 66.7% and hypoalbuminemia was in 33.3%; serum creatinine was also increased in 57.6% study population.

Devasagayam E et al., study showed that 81.7% of residents from rural areas exposed to shrubs are affected. Agricultural labourer's (53.3%) were at the highest risks of contracting the illness. Sero prevalence was reported 34.2% and 25.3% of all the hospitalised AEFI are reported scrub typhus [26]. Thapa S et al., study showed 29.2% were scrub typhus positive from Chitwan district, and 51.7% with predominance among women, highest seropositivity was found in month of July i.e., 57.7%. with thrombocytopenia 73.7% and raised transaminase aspartate aminotransferase i.e. 76.1% are seen [27].

Early presentation of disease with duration of fever less than 10 days had better prognosis when compared with the fever of duration more than 12 days. Prophylaxis of scrub typhus is doxycycline has shown promised outcome when started before onset of the infection. Scrub typhus is a life-threatening disease which is geographically expanding over time, therefore a well-established surveillance system along with collaborative actions in endemic regions using early diagnostic strategies to effectively control, and prevent the spread and outbreaks. Early diagnosis and prompt treatment which improves the awareness of the disease, point-of-care diagnosis, and appropriate therapy can help reduce this public health threat in the future.

Limitation(s)

As this was a retrospective study, scrub typhus is common infection occurring in India, though no previous data was obtained in our area of West Bengal therefore we were not able to compare present study and give the prevalence rate. The sample size was comparatively low though the infection is very common in India.

CONCLUSION(S)

Scrub typhus, a long forgotten and neglected infectious disease, with no licensed vaccines is undoubtedly a re-emerging and threatening disease. It has been proved that scrub typhus is one of the commonest causes of AFI in India. Early diagnosis and management is very much essential to prevent disease complication. Most importantly, the health system needs to

be strengthened for systematic surveillance, early outbreak detection and immediate responses including treatment and preventive measures in the country. Understanding the ecology of this important neglected disease has crucial implications for our development of strategies to mitigate human infection. All clinicians should be aware of this disease keeping in mind that whenever a patient present with fever and increased liver enzymes with or without eschar, a diagnosis of scrub typhus should be considered.

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