

Original Research Article

## Clinico-Serological Study on Scrub Typhus Infection in Suburban Areas of Chennai

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**Abstract:** Rickettsial infections were documented in many parts of India, out of which Scrub typhus is the most common. Diagnosis of Scrub typhus is still challenging in India due to lack of awareness and confirmatory diagnostic methods. This study is conducted to evaluate the serological evidence of scrub typhus infection in suburban areas of Chennai. 100 consecutive blood samples were collected from patients presenting with signs and symptoms of Fever of Unknown Origin (FUO). Serum was separated and Welix Felix test was done using OX2, OX19 and OXK antigens. The results were documented and analysed. Of the total study population 59% were males and 41% were females. The most common presenting symptom was fever (100%) followed by rash (64%). Escher was seen only in 23% of the cases. Out of 100 samples tested, 4 samples were positive for scrub typhus, of which 3 were under the age group of 15 yrs. All 4 cases had fever and rash. 2 patients had eschar and 2 had lymphadenopathy. Our study clearly shows the existence of Scrub typhus disease in suburban areas of Chennai. Hence it is strongly recommended to include Scrub typhus in the differential diagnosis of patients with FUO and to include macrolides in empirical therapy for appropriate cases.

**Keywords:** Scrub typhus, Serological evidence, Suburban areas of Chennai

### INTRODUCTION

Rickettsiae are a diverse collection of organisms which are usually transmitted to humans by arthropod vectors. The rickettsial infections caused by the organisms can be broadly classified into three major groups namely, Spotted fever group, Typhus fever group and Scrub typhus group. The epidemiology of human diseases caused by Rickettsiae is intimately related to the biology of the vector that transmits it. In India, Rickettsial diseases have been documented from various states including Maharashtra, Kerala, Tamilnadu, Rajasthan etc [1]. Rickettsial infections are one of the important causes of fever of unknown origin (FUO) and these needs to be differentiated from other febrile illnesses like enteric fever, malaria, dengue, leptospirosis, infectious mononucleosis etc...Among Rickettsial infections Scrub typhus is the most common rickettsial infectious disease found in India [2].

Scrub typhus is a Rickettsial disease caused by *Orientia tsutsugamushi* and is transmitted by the bite of Trombiculid mite. Scrub typhus is endemic in the tropical and subtropical regions of the Asian continent

[3]. They commonly present as non specific febrile illness, rashes, lymphadenopathy, vomiting etc. along with presence or absence of characteristic eschar. The disease varies widely in its severity ranging from self limited illness to fulminating life threatening infections and even death, which is about 1-30% of untreated cases. At present most of the scrub typhus cases are under diagnosed due to low index of suspicion and lack of confirmatory diagnostic techniques. A high degree of clinical suspicion with knowledge of local prevalence of this disease will help in early diagnosis and treatment as it is frequently associated with respiratory, neurological and renal complications.

This study is conducted to evaluate the clinical presentations and serological evidence of scrub typhus infection in suburban areas of Chennai, as very minimal studies are available indicating the burden of scrub typhus infection in the community.

### MATERIALS AND METHODS

The study was conducted after getting ethical clearance from the institutional ethical committee. A

total of 100 consecutive blood samples were collected from patients who presented with high grade fever with features of headache, malaise, nausea, rash, edema, eschar, lymphadenopathy etc., where the cause of the fever remains undiagnosed. Informed consent was obtained from the patients and in case of paediatric cases consent was obtained from their parents. Demographic and clinical presentations details were obtained by using a preformed questionnaire. About 3ml of blood is collected from the study population. Serum was separated and stored for serological test. Routine blood examinations like Total blood count, Hemoglobin estimation and ESR were performed and the results were documented.

Weil Felix tube agglutination test was performed in the test serum samples using whole cell antigens OX2, OX19 from *Proteus vulgaris* and OXK from *Proteus mirabilis*. The antigens were obtained from King Institute of Preventive Medicine, Guindy. The test was done using standard protocols with doubling dilutions of 1:20 to 1:160[4]. Those samples that gave a titre of more than 1:80 were considered as positive [2] and confirmatory test was done with all Weil Felix test positive samples, in a

private laboratory by IgM ELISA detection methods. The results were documented and analysed statistically.

**RESULTS**

Out of the 100 test samples collected 59% were males and 41% were females. The majority of the patients in the study population belongs to the age group of 0-5 yrs (41%), followed by 6-10yrs (24%) (Fig- 1).

The most common clinical presentation was fever with more than one week duration (100%) followed by rash (64%). Eschar was noted only in 23% of cases (Fig- 2)

On performing Weil Felix test with 100 serum test samples 4 were found to be positive with titre of >1:80. These samples were also confirmed to be positive for IgM antibody ELISA detection method (Fig-3).

Of the 4 positive cases 3 were males and 1 was female. Out of 4 positive cases 3 were under the age group of 15 yrs. All 4 cases had fever and rash. 2 patients had eschar and 2 had lymphadenopathy.

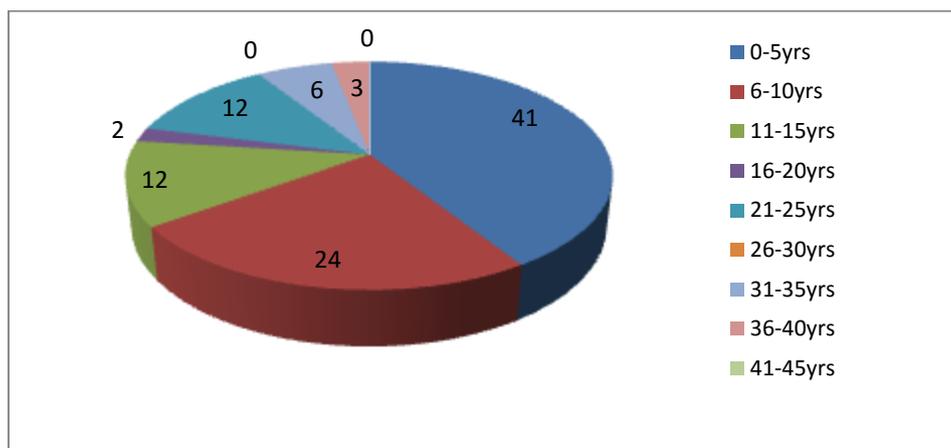


Fig-1: Age distribution among the study population (n=100)

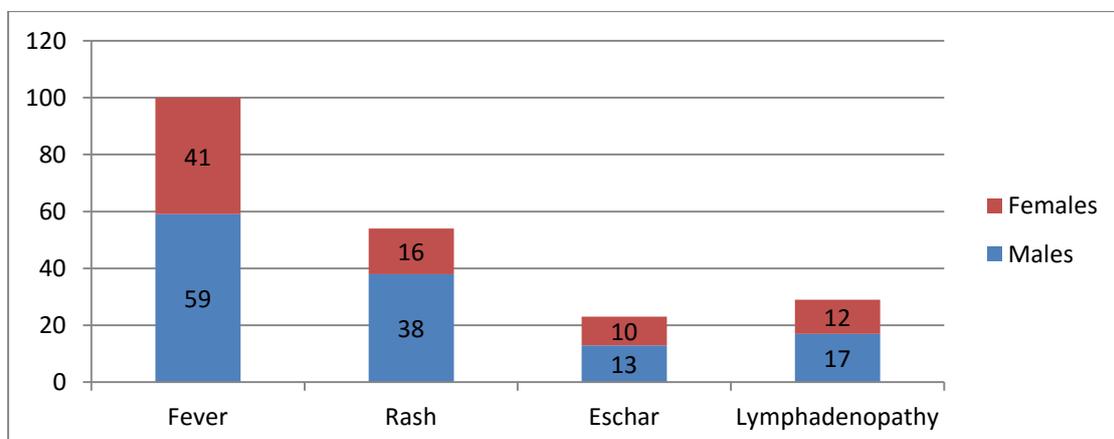


Fig-2: Symptoms and signs distribution among the study population (n=100)

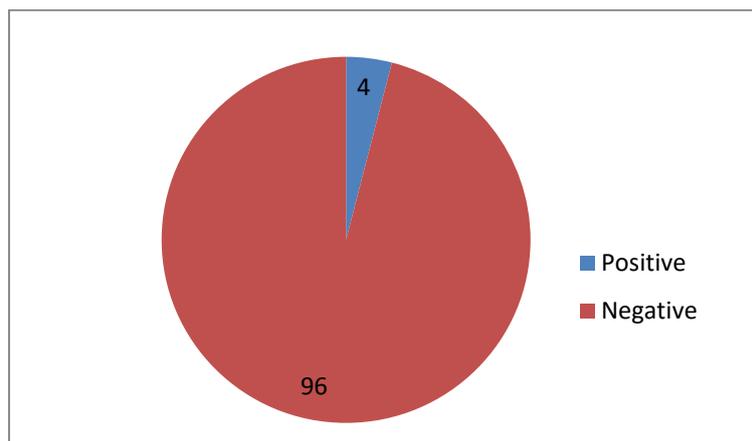


Fig-3: Scrub typhus positivity rate among the study population (n=100)

## DISCUSSION

Scrub typhus is often an ignored disease while considering the etiology of Fever of Unknown Origin (FUO), even though literature evidence suggests their existence in India. Accurate and early diagnosis of scrub typhus is still a challenge in India because of its nonspecific presentation and the lack of confirmatory diagnostic resources in many rural and semi urban areas.

The seropositivity rate in our current study is about 4%, which shows that scrub typhus does prevail in suburban areas of Chennai and is re-emerging. Many other researchers conducted in India showed a prevalence rate between 15%-56.42% for scrub typhus in India [5, 6]. The suburban areas are fast growing, with people occupying the social forest regions, has resulted in frequent encounter between the host and the vector causing a rise in the incidence of scrub typhus infection. The low seropositivity rate in our study might be due to low index of clinical suspicion, less sample size and lack of confirmatory diagnostic methods which are more sensitive.

Weil Felix test is an old, simple, economical assay that is based on detection of antibody to various *Proteus* antigens that cross react with members of family Rickettsiaceae. In our study, there is a 100% correlation of positive samples when tested with both Weil Felix method and IgM antibody ELISA method. The specificity and positive predictive value of the Weil felix test was found to be 100% when concerned with OXK antigen. It has been recommended by many studies as an initial screening test and guide to clinicians in areas where the actual burden of the disease has not been still assessed [2, 7].

Of 4 positive cases, 3 (75%) of the cases are under 15 yrs of age. This is of concern as children are more prone to play in outdoor vegetative area, thereby increasing their chances to come in contact with the

vector. Also it has been documented that scrub typhus is regarded as life threatening infection in children as they are more prone to complications, even death. Prompt clinical diagnosis and treatment should be started to avert morbidity and mortality [8].

All the 4 positive cases in our current study, presented with high grade fever (100%) with rashes (100%). The characteristic clinical sign eschar and lymphadenopathy is observed only in 50% of cases. Many studies conducted in South India by Varghese GM *et al.* and Selvaraj Stephen *et al.* showed that eschar was found only in 55% [9] and 21.43% [10] of their cases respectively. This indicated the need for screening all FUO patients, irrespective of the presence or absence of eschar, to improve the detection and diagnosis of this condition. Also many a patient who presented with eschar had shown negative results with Weil Felix test, which detects antibody 5-10 days after the onset of the symptoms. Perhaps a paired serum sample testing if conducted would have yielded a higher positivity rate.

## CONCLUSION

Scrub typhus may be a serious public health threat if it remains undiagnosed or under diagnosed. This may also add onto the financial burden to their families. Our study definitely shows the existence of this disease in suburban areas of Chennai and thereby emphasizes the need for enhanced awareness among the physicians. In areas where scrub typhus fever has been documented it is strongly recommended to include them in differential diagnosis of FUO and thereby to include macrolides or doxycycline in empirical therapy as delay in treatment may lead to life threatening complications.

Proper entomological and epidemiological studies are recommended which will enable us to know the exact magnitude and distribution of vector and the disease. This may help in strategies for guiding active surveillance and vector control measures.

Our study is limited, as it is based on a single centre with small sample size. Large multicentric studies using highly sensitive and specific immunofluorescence test and ELISA techniques for laboratory diagnosis will throw light on our present understanding of the endemicity and actual prevalence of scrub typhus in India and thereby may enlighten us in prevention and control measures.

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