

SEROPREVALENCE OF SCRUB TYPHUS AMONG PATIENTS OF ACUTE FEBRILE ILLNESS IN A TERTIARY CARE CENTRE



Microbiology

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ABSTRACT

Introduction: Malaria, dengue, typhoid, scrub typhus and several viral infections have been classically responsible for outbreaks of acute febrile illness. In recent years, scrub typhus has rapidly emerged to become the major cause of AFI in many parts of India, especially during the monsoon and postmonsoon seasons. Scrub typhus, caused by *Orientia* (formerly *Rickettsia*) *tsutsugamushi*, is an acute infectious disease that is transmitted to humans by an arthropod vector of the Trombiculidae family. This study was carried out to know the epidemiology and seroprevalence of scrub typhus in patients of acute febrile illness as early diagnosis and institution of specific treatment will reduce morbidity and mortality.

Material and method: This prospective, observational study was carried out at a tertiary care hospital in the Hadoti region of Rajasthan from August 2018 to December 2018. All demographic data and detailed history were recorded. Scrub typhus serology was tested for IgM antibodies against *O. tsutsugamushi* using IgM ELISA kits (INBIO).

Result: Total 609 samples were tested for scrub typhus out of which 120 samples were found positive. Out of 120 sample 62 and 58 were males and females respectively. Highest seropositivity was found in 21-40 year age group and among rural population. The clinical manifestations varied from minimal to severe illness with 3 case fatalities.

Conclusion: Scrub typhus should be included in the differential diagnosis of acute febrile illness along with malaria and dengue fever which are other endemic diseases in this region, which will help in proper diagnosis, timely and adequate treatment.

KEYWORDS

scrub typhus, acute febrile illness, seroprevalence

INTRODUCTION

Acute febrile illness (AFI) is the most common presenting complaint in the emergency and outpatient clinics in developing countries. Outbreaks of AFI occur usually in the rainy and post-rainy season in India. Malaria, dengue, typhoid, scrub typhus, and several viral infections have been classically responsible for such outbreaks.[1] In recent years, scrub typhus has rapidly emerged to become the major cause of AFI in many parts of India, especially during the monsoon and postmonsoon seasons.

Scrub typhus, caused by *Orientia* (formerly *Rickettsia*) *tsutsugamushi*, is an acute infectious disease of variable severity that is transmitted to humans by an arthropod vector of the Trombiculidae family.[2] *O. tsutsugamushi* is an obligate intracellular, gram negative bacteria. The chigger mites of genus *Leptotrombidium* are responsible for the disease transmission.[3] which are found in areas of heavy scrub vegetation. The bite of this mite leaves a characteristic black eschar that is useful for making diagnosis. Occurrence of *L. delicense* is influenced by rainfall, with more chiggers attached to the rodents in the wetter months of the year, which may be the reason for clustering of cases during the rainy season as shown by Gurung *et al.*[4]

Scrub typhus is a zoonotic infectious disease. Human beings get infected accidentally when they encroach upon mite-infested rural and suburban areas.[5] It is often acquired during recreational, occupational or agricultural exposure because crop fields and scrub vegetation are an important reservoir for transmission.

The average incubation period of *O. tsutsugamushi* in humans is 10–12 days, the onset of disease is characterized by fever, headache, myalgia, cough, and gastrointestinal symptoms. Patients often present with pyrexia of unknown origin.[6] The severity of the symptoms varies widely, depending on the susceptibility of the host, the virulence of the bacterial strain, or both. Various serological tests are available like Weil-Felix test, Indirect immunofluorescence, rapid card tests and IgM ELISA. In this study IgM ELISA was evaluated and found to be quite satisfactory.

With the changing epidemiology of scrub typhus, it is now among the commonest causes of AFI in India. It is important to get familiar with the clinical and diagnostic laboratory features of scrub typhus, so as to

differentiate it from other etiologies of AFI. This study was carried out to know the epidemiology and seroprevalence of scrub typhus in clinically suspected patients as early diagnosis and institution of specific treatment will reduce morbidity and mortality from this infectious disease.

MATERIAL AND METHOD

This prospective, observational study was carried out at a tertiary care hospital in the Hadoti region of Rajasthan from August 2018 to December 2018 after taking permission from ethical committee. All clinically suspected patients of acute febrile illness (in whom malaria, dengue fever, enteric fever, viral pharyngitis were excluded by history, clinical examination and appropriate laboratory investigations) were included in this study. All demographic data and detailed history were recorded. Scrub typhus serology was tested for IgM antibodies against *O. tsutsugamushi* using IgM ELISA kits (INBIO). The test was performed as per manufacturer instructions. All relevant data were recorded and analysed.

RESULTS

During the study period extending from August 2018 to December 2018, total 609 samples were tested for scrub typhus out of which 120 samples were found positive. Age, sex, geographic and seasonal distribution of cases is shown in tables I - V.

Table I

Total no. of cases	Total no. of positive cases
609	120 (20%)

Table II Sex wise distribution

Total male No. (%)	Total male positive No. (%)	Total female No. (%)	Total female positive No. (%)
335 (55 %)	62 (51.67 %)	274 (45 %)	58 (48.33 %)

Table III Age wise distribution

Age (years)	Total male No. (%)	Total male positive No. (%)	Total female No. (%)	Total female positive No. (%)
0 – 20	70 (20.8 %)	06 (9.8 %)	43 (15.6 %)	09 (15.5 %)
21 – 40	140 (41.7 %)	25 (39.3 %)	125 (45.6 %)	29 (50.0 %)

41 – 60	90 (26.8 %)	23 (37.7 %)	73 (26.6 %)	16 (27.5 %)
61 – 80	35 (10.4 %)	08 (13.1 %)	33 (12.0 %)	04 (6.8 %)
Total	335	62	274	59

Table IV Month wise distribution

Month wise distribution	Total No. of cases	Positive cases
August	06	02
September	198	65
October	248	39
November	131	11
December	26	03

DISCUSSION

This is first study on the seroprevalence of Scrub typhus from Hadoti region where such a large number of samples were studied.[7,8] The prevalence of scrub typhus varies from 0-8% to 60% in different countries. In a study from Thailand, the positivity for scrub typhus was 59.5% with highest prevalence in 40-49 (77.7%) year age group with no difference between the two sexes.[9] Gurung et al., tested 204 patients with fever of unknown origin of which 63 were confirmed positive of which 42 were males and 21 were females.[10] In our study, among the 609 samples of acute febrile illness, 120 (20 %) were found positive for scrub typhus, 63 were dengue positive by IgM ELISA, 5 cases were positive for malaria parasite out of which 3 were *P. vivax*, 2 were *P. falciparum* and 1 mixed infection. Out of 120 positive samples 62 (51.67 %) males and 58 (48.33 %) females were found positive which correlate with study done by Ramyasree et al.[11]

Highest seropositivity was found in 21-40 year age group in our study which may be due to more active life style of this age group. People working outdoor tend to be affected more often. Also most of the positive cases were from rural areas and in months of September and October (immediate post monsoon period) as there is growth of secondary scrub vegetation, which is the habitat for trombiculid mites. Similar findings were reported by Sinha et al and Medi et al [12,13]

The clinical manifestations of this disease vary from minimal to severe fatal illness with multiorgan dysfunction.[14] In our study 3 case fatalities were reported.

Eschar at the site of attachment of the larval mite is considered highly suggestive of scrub typhus, but occurs in a variable proportion of patients in different studies. [13] Its presence is considered pathognomic of the disease but its absence does not exclude the possibility of scrub typhus. Premaratna et al. also postulated that in dark-skinned patients early/ very small eschar could be easily overlooked. [15] In our study we did not observe eschar in any patient. Sinha et al also did not observe eschar in any patient.[12]

The diagnosis of scrub typhus poses a problem due low index of suspicion, non specific signs and symptoms, absence of specific presentation of an eschar and lack of diagnostic facilities in India. There are several diagnostic tests available with their own advantages and disadvantages. Indirect immunofluorescence test, the gold standard is beyond affordability specially in poor and developing countries like India and needs expertise for interpretation.[16] IgM ELISA is an easy and comparatively economic method. Jang et al. evaluated IgM ELISA for the diagnosis of scrub typhus and reported sensitivity of 96.3% for IgG IFA – positive samples and of 100% for 100% for IgM IFA- positive samples. The specificity of the IgM capture ELISA was 99%, for IgM- positive samples.[17]

It is recommended that scrub typhus should be included in the differential diagnosis of acute febrile illness along with malaria and dengue fever which are other endemic diseases in this region, which will help in proper diagnosis, timely and adequate treatment and avoidance of the complications which are associated with high mortality.

REFERENCES

1. Chrispal A, Boorugu H, Gopinath KG, Chandy S, Prakash JA, Thomas EM, Abraham AM, Abraham OC, Thomas K. 2010. Acute undifferentiated febrile illness in adult hospitalized patients: the disease spectrum and diagnostic predictors—an experience from a tertiary care hospital in south India. *Trop Doct* 40: 230–234.
2. Mahajan SK. Scrub typhus. *J Assoc Physicians India*. 2005;53:954-8.
3. Parola P, Paddock CD, Raoult D. 2005. Tick-borne rickettsioses around the world: emerging diseases challenging old concepts. *Clin Microbiol Rev* 18: 719–756.
4. Gurung S, Pradhan J, Bhutia PY. Outbreak of scrub typhus in the North East Himalayan region Sikkim: An emerging threat. *Indian J Med Microbiol* 2013;31:72-4.
5. Vivekanandan M, Mani A, Priya YS, Singh AP, Jayakumar S, Purty S. Outbreak of scrub typhus in Pondicherry. *J Assoc Physicians India* 2010;58:24–8.

6. SaahAJ. *Orientia tsutsugamushi* (scrub typhus). In: Mandell GL, Bennett JE, Dolin R, editors. *Principles and Practice of Infectious Disease*. 5th ed. Philadelphia, Pa: Churchill Livingstone; 2000. p. 2056-7.
7. Taylar AC, Hill J, Kelly DJ, Davis DR, Lewis GE Jr. A serological survey of scrub, tick, and endemic typhus in Sabah, East Malaysia. *Southeast Asian J Trop Med Public Health* 1986;17:613-9.
8. Chanyasanha C, Kittigul L, Puenchitton S, Sangsuwan P. Antibodies titers to rickettsial diseases in blood donor in Bangkok by Indirect immunoperoxidase technique. *Proc Natl Epidemiol Semin Bangkok* 1992;167-9.
9. Chanyasanha C, Kaeburong K, Chenchittikul M, Sujirarat D. Seroprevalence of scrub typhus infection in patients with pyrexia at some malaria clinics in three western provinces of Thailand. *Asian Pac J Allergy Immunol* 1998;16:119-25.
10. Gurung S, Pradhan J, Bhutia PY. Outbreak of scrub typhus in North Eastern Himalayan region-Sikkim: An emerging threat. *Indian J Med Microbiol* 2013;31:72-4.
11. Ramyasree A, Kalawat U, Rani ND, Chaudhury A. Seroprevalence of Scrub typhus at a tertiary care hospital in Andhra Pradesh. *Indian J Med Microbiol* 2015;33:68-72.
12. Sinha P, Gupta S, Dawra R, Rijhawan P. Recent outbreak of scrub typhus in north western part of India. *Indian J Med Microbiol* 2014;32:247-50.
13. Madi D, Achappa B, Chakrapani M, Pavan MR, Narayanan S, Yadlapati S, et al. Scrub typhus, a reemerging zoonosis—an Indian case series. *Asian J Med Sci* 2014;5:108- 11.
14. Chrispal A, Boorugu H, Gopinath KG, Prakash JA, Chandy S, Abraham OC, et al. Scrub typhus: An unrecognized threat in South India- clinical profile and predictors of mortality. *Trop Doct* 2010;40:129-33.
15. Premaratna R, Chandrasena TG, Dassayake AS, Loftis AD, de Silva HJ. Acute hearing loss due to scrub typhus: Forgotten complication of re-emerging disease. *Clin Infect Dis* 2006;42:e6-e8.
16. Blacksell SD, Bryant NJ, Paris DH, Doust JA, Sakoda Y, Day NP. Scrub typhus serologic testing with indirect immunofluorescence method as a diagnostic gold standard: A lack of consensus leads to a lot of confusion. *Clin Infect Dis* 2007;44:391-401.
17. Jang WJ, Huh MS, Park KH, Choi MS, Kim IS. Evaluation of an immunoglobulin M capture enzyme- linked immunosorbent assay for diagnosis of *Orientia tsutsugamushi* infection. *Clin Diag Lab Immunol* 2003; 10:394-8.