

A STUDY ON SEROPREVALENCE OF SCRUB TYPHUS INFECTION AMONG PATIENT VISITING A TERTIARY CARE HOSPITAL

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Abstract

Background: *Orientia tsutsugamushi* is the causative agent of scrub typhus. A trio of symptoms, including maculopapular rash, regional lymphadenopathy, and eschar seen in the bite site, comprise the clinical presentation of scrub typhus. Trombiculid mites, small mammals, secondary scrub vegetation, and the rainy season are examples of zoonotic tetrads. In order to avoid consequences like encephalitis and interstitial pneumonia brought on by vascular injury, early identification and treatment are crucial. One infectious disease that is resurfacing is scrub typhus. In India, it is the most prevalent rickettsial illness with a high seroprevalence. **Materials and Methods:** From July to December 2021, a Government medical college hospital in Thiruvannamalai conducted a study on the seroprevalence of scrub typhus. IgM antibodies against *O. tsutsugamushi* were found using the qualitative MAC-ELISA technique. **Result:** The age group of patients under 12 years old (237, 57.24%) and the greatest number of male patients (222, 53.62%) were found to have seropositivity at 414 (28.39%). October saw the most cases on record, with December following closely behind. **Conclusion:** Scrub typhus is a re-emerging infectious disease in India it has been steadily increasing and reported from all the states in the last few years. Scrub typhus became more common in the post-monsoon months of September through November. Children had a higher incidence of seropositivity because they were raised in an environment where outdoor activities were more common. Although occurrences are primarily reported from rural regions, urban areas have also been reporting an increasing number of cases recently. It possesses a variety of antigens, and immunity waned after a year or three.

INTRODUCTION

Orientia tsutsugamushi, formerly known as *R. tsutsugamushi*, *R. orientalis*, and also included under *Rickettsia*, is the causative agent of scrub typhus; however, it differs from other forms of rickettsia in that it lacks the lipopolysaccharide layer from cell walls.^[1,2] Because it grows in areas with scrub vegetation, which is made up of low-lying trees and bushes, it is known as scrub typhus. It is a parasite that is obligately intracellular. Scrub typhus was documented in thousands of instances among military personnel during World War II. This is a feverish, acute infectious disease. Trombiculid mites are the Scrub Typhus vector, and disease transmission occurs through the bite of an infected mite. The only stage of the mite that feeds on people is the larval stage, which is represented by chiggers. Thus, chiggerosis is another name for scrub typhus.^[1,2] Via transovarian transmission, mites can

sustain the organism. A trio of symptoms, including maculopapular rash, regional lymphadenopathy, and eschar seen in the bite site, comprise the classic clinical presentation of scrub typhus. In 40% to 50% of cases, it is observed. Fever, headache, myalgia, cough, and stomach discomfort are examples of non-specific symptoms. After the initial bite, the illness lasts for ten to twelve days.^[1] If treated with medication, the temperature will go down in about 36 hours; otherwise, problems or even death could happen. In rare cases of late-stage vascular injury, consequences like encephalitis and interstitial pneumonia can be avoided with early diagnosis and treatment. Scrub typhus is the most common type of rickettsial illness. *O. tsutsugamushi* is known as the zoonotic tetrad because it depends on four factors to survive in the wild: small mammals, secondary scrub vegetation, tropic level, and the rainy season.^[1] In the event that it is native to the "tsutsugamushi triangle," which extends from Northern Japan and far-eastern Russia in the north,

to Northern Australia in the south, and to Pakistan in the west. In India, it is the most prevalent rickettsial illness. Scrub typhus outbreaks have been documented in Himachal Pradesh, Sikkim, and Darjeeling in 2003–2004 and 2007—as well as sporadically in Bihar, Rajasthan, and Maharashtra in the past. Scrub typhus outbreaks have also been documented in Southern India, primarily in rural regions during the winter months in Pondicherry, Karnataka, Tamilnadu, and Kerala. Scrub typhus can also be diagnosed by serological testing, which includes western blot, Weil-Felix test, rapid test, indirect immunofluorescence antibody, and antibody detection (IgM) by ELISA.^[1]

MATERIALS AND METHODS

Study Design and Duration

From July 2021 to December 2021, a cross-sectional study was conducted at the Department of Microbiology at the Government Thiruvannamalai Medical College & Hospital.

Sample Size

1458 patients were included in the study.

Inclusion Criteria

Patients having a history of fever and symptoms suggestive of scrub typhus who were seen in our hospital's outpatient and inpatient departments.

Exclusion Criteria

Fever from non-infectious sources and from known infectious diseases like Typhoid, Dengue, and Hepatitis.

Sample Collection

Strict aseptic measures were followed in the collection of about 3-5 ml of blood. After centrifuging for two minutes at 1000 rpm, serum was separated. The InBios kit (MAC - ELISA Test) was used to test serum for IgM antibodies for scrub typhus by IgM ELISA.

Laboratory Testing

O. tsutsugamushi IgM antibodies were found using the qualitative ELISA method. Every plate's well has a unique recombinant antigen coated in it. The serum samples were added to each well during testing after being diluted with InBios sample diluent. Following washing, horseradish peroxidase (HRP)-labeled polyclonal Goat anti-human IgM antibodies were applied to the wells. Tetramethylbenzidine (TMB) substrate was added to the wells following a second washing. After adding the stop solution, the absorbance at 450 nm was used to calculate the substrate's degree of enzymatic turnover.

RESULTS

The current study was conducted for six months, from July 2021 to December 2021, in the Government Thiruvannamalai Medical College & Hospital's Department of Microbiology. There were 1458 individuals in all who were tested

for IgM antibodies by ELISA and had a history of fever and other symptoms suggestive of scrub typhus.

[Figure 1] shows the distribution of the study population by age. The age group of <12 years old comprises the majority of the participants in the research population 621 [43%], followed by 21–40 years old 447 [31%], and the age group of >60 years old is very less 52 [3%].

According to [Figure 2], the months of October, December, and November had the highest number of positive results in our study. Scrub typhus is quite prevalent during the post-monsoon season. In recent years, scrub typhus, an infectious illness that has been reemerging in India, has been recorded from every state.

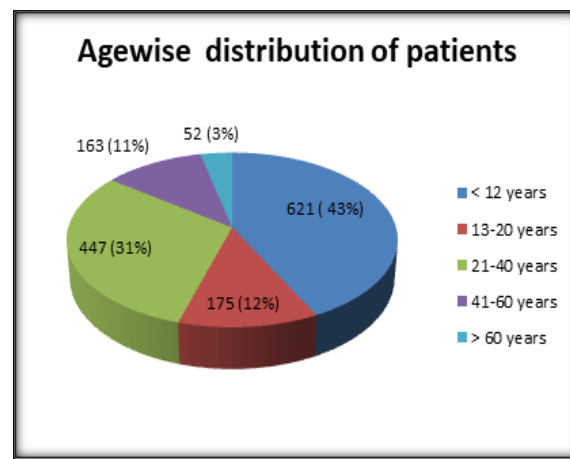


Figure 1: Age wise distribution of patients

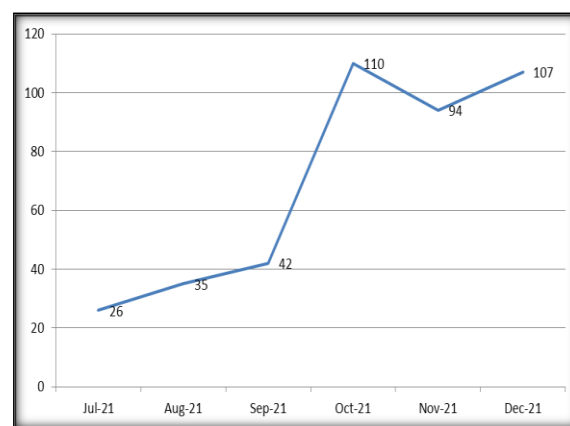


Figure 2: Month wise distribution of positive cases

Of them, 773 [53%] were male patients, somewhat more than the 685 [46.98%] female patients. The scrub typhus seropositivity in our investigation was 414[28.39%]. Of the 414 individuals with seropositivity, 222 [53.61%] were men and 192 [46.37%] were women [Table 1].

[Table 2] The findings of our study indicated that the age group under 12 had a higher percentage of seropositivity 237[57.24%], followed by the age group 21–40 years 79 [19%]. Children's habitat involves more outside activities, which may account

for the greater rate of seropositivity observed in them.

Table 1: Distribution by gender

Gender	Total number of patients n=1458	Seropositivity n=414
Male	773 (53%)	222(53.62%)
Female	685(46.98%)	192(46.37%)

Table 2: Age wise distribution among positive patients

S.No	AGE	Positive patients		Percentage of positivity
		Men	Women	
1	< 12 years	129	108	237(57.24%)
2	13-20 years	27	21	48(11.6%)
3	21-40 years	35	44	79(19%)
4	41-60 years	26	14	40(9.6%)
5	>60 years	5	5	10(2.4%)

DISCUSSION

Over the course of six months, a total of 1458 individuals had their serum samples examined in the microbiology laboratory for the possibility of having scrub typhus. Of them, 773 [53%] were male patients, somewhat more than the 685 [46.98%] female patients [Table 1].

Male patients outnumber female patients, according to numerous researches. It is a fact that men engage in outdoor activities more often than women. The scrub typhus seropositivity in our investigation was 414 [28.39%]. Of the 414 individuals with seropositivity, 222 [53.61%] were men and 192 [46.37%] were women [Table: 1].

Of the 414 individuals with seropositivity, 222 [53.61%] were men and 192 [46.37%] were women [Table 1]. Senthilvadivu et al. (2018) reported a seroprevalence of 58%, which is significantly higher than the seroprevalence of P. Trowbridge et al. (2017), which showed a seroprevalence of 31.8%. In comparison to our study and other studies, Paulraj et al.'s (2021) showed 6.07% seroprevalence, which is extremely low.

In several research, such as Maria Sindhura John et al., (2014), [Table 1] indicated a higher prevalence in the male gender than the female gender; however, a study by Trowbridge et al., (2017) & Senthilvadivu et al., (2018) finds a female preponderance. The findings of our investigation also corroborate the higher predominance of male gender.

[Figure 1] Distribution of the study population by age. The age group < 12 years old comprises the majority of the study population (43%), followed by 21–40 years old (31%) and the very small age group of >60 years old (3%). The study by Saramma Mini Jacob et al. (2018) correlates with the study participants' age group.

According to Saramma Mini Jacob et al. (2018), 31% of people in the 21–40 age range and 41% of people in the 4–20 age group. High prevalence (77.7%) was observed in the 40–49 age group by Ramyasree et al. (2015). However, the results of our study [Table 2] revealed that the age group under 12 had a greater prevalence of seropositivity (57.24%),

followed by the age group 21–40 years (19%). Children's habitat involves more outside activities, which may account for the greater rate of seropositivity observed in them.

According to our survey, October had the highest amount of positive records, followed by December and November. In October, Paulraj et al. (2021) documented the highest number of instances. Senthilvadivu et al. (2018) found that the post-monsoon months of September through November saw a rise in the incidence of scrub typhus.

In recent years, scrub typhus, an infectious illness that has been reemerging in India, has been recorded from every state. In the colder months of the year, epidemics have been observed in Puducherry, Karnataka, Tamilnadu, and Kerala. Although occurrences are primarily reported from rural regions, urban areas have also been reporting an increasing number of cases recently. It possesses a variety of antigens, and immunity waned after a year or three.

The five main categories of antigenicity are Gilliam, Karp, Kato, Boryon, and Kawazaki. A vaccine that works is not yet approved. Numerous vaccine trials, including those for dead, live, and subunit vaccines, were attempted.

CONCLUSION

The seropositivity of scrub typhus was 28.39%, prevalence increased in the male gender. Children's habitat involves more outside activities, which may account for the greater rate of seropositivity observed in them. Our study indicates that Thiruvannamalai has a high prevalence, mostly in youngsters. Take the appropriate measures to prevent control efforts during the post-monsoon season, such as controlling rodent populations and applying herbicides to scrub vegetation. In India, it is the most prevalent case of Rickettsial illness. Physicians need to be aware of the severity of this issue and consider it to be one of the potential causes of PUO (Pyrexia Of Unknown Origin).

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