

## **Seroprevalence of Scrub Typhus among Widal Negative, Febrile Patients by a Rapid Immuno-Chromatographic Test**

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**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

### **Abstract**

**Objective:** Though scrub typhus cases have been reported from several parts, it still remains an under-diagnosed disease in India. It is crucial to understand the epidemiology of scrub typhus in order to address this public health problem

**Methods:** This study was conducted in the tertiary care hospital of north India over a duration of one year. The common causes of febrile illness in our setting were ruled out by relevant investigations and clinical history. For the qualitative detection of IgG or IgM antibodies to members of *O.tsutsugamushi* species, rapid immuno-chromatographic test was performed on 100 randomly selected serum samples.

**Results:** Majority of the cases belonged to 19-35 years age group. Out of 100 patients, the serum samples of 5% were reactive for IgG or IgM antibodies to members of *O.tsutsugamushi* species. In 3% of the febrile patients only IgG antibodies and in 1% only IgM antibodies were observed.

**Conclusions:** There is an urgent need to re-evaluate the burden of this treatable infection to aid the clinicians and policy makers in the timely and effective management of scrub typhus.

**Key words:** Scrub typhus; febrile; Rickettsia; rapid test

### **Introduction**

Scrub typhus is an arthropod borne disease caused by the bacillus *Orientia tsutsugamushi*.<sup>1</sup> This obligate intracellular pathogen is transmitted to humans and other mammalian hosts by the bite of infected larval stage of *Leptotrombidium* mites *i.e.* chiggers.<sup>2, 3</sup> Hence, scrub typhus is sometimes also referred to as chiggerosis. Mites constitute the primary reservoirs for *O. tsutsugamushi*.<sup>4</sup> Scrub typhus is endemic to a landmass covering above 8 million km<sup>2</sup>, known as the “tsutsugamushi triangle”. It is bounded in North by Northern Japan and far-eastern Russia, in South by Northern Australia and by Pakistan in the West. Several countries come under the boundaries of this triangle including Japan, China, Philippines, and South-East Asia, involving India, Afghanistan, Pakistan, New Guinea, tropical Australia and Pacific Islands.<sup>5-7</sup> Worldwide one billion individuals are at the risk and one

million develop scrub typhus annually. It forms a significant public health issue in Asia-Pacific region including India.<sup>3,8</sup>

Though scrub typhus cases have been reported from several parts, it still remains an under-diagnosed disease in India.<sup>9-11</sup> The most characteristic clinical presentation of scrub typhus is eschar at the site of bite. However, It is more clearly visible on Caucasian and East Asian patients than the South Asian patients with comparatively darker skin.<sup>12</sup> Majority of the scrub typhus cases present with non-specific symptoms like fever, headache, lymphadenopathy, myalgia, gastrointestinal symptoms etc. Fever has been reported to be present in 95%- 100% confirmed cases of scrub typhus.<sup>3,13</sup> Persisting febrile illness despite the exclusion of other major prevailing causes of fever in the region may impart an important clue for the scrub typhus as the probable aetiology.

Despite the global presence and recent re-emergence of scrub typhus, it still remains a neglected infectious disease.<sup>14</sup> The gaps in the current knowledge of its epidemiology further accentuates the problem. There is limited availability of sporadic data regarding the prevalence of scrub typhus from the various geographical regions of the world including India. Hence, scrub typhus always remains at the bottom of the list constituting the differential diagnosis in a case of febrile illness. It is crucial to understand the epidemiology of scrub typhus in our region in order to address this public health problem effectively. Therefore the objective of our study was to determine the seroprevalence of scrub typhus among widal negative febrile patients.

#### **Material and methods**

This study was conducted in the Immunology section, Microbiology department of a tertiary care hospital of north India over a duration of one year. The patients

presenting with febrile illness, irrespective of any age group were included in the present study. The common causes of febrile illness in our setting were ruled out by relevant investigations and clinical history. A written informed consent was taken from all the cases. 5 ml blood sample was collected from all the patients, serum was separated and stored at -70<sup>0</sup> C till assayed. For the qualitative detection of IgG or IgM antibodies to members of *O.tsutsugamushi* species, rapid immuno-chromatographic test was performed on 100 randomly selected serum samples by using the Bio Footprints *Mytest Scrub typhus* Ab test card (India), according to manufacturer's instructions. Briefly, 2.0 µl of serum was applied to the sample well and subsequently two drops of sample buffer were added to other well. Results were read at the end of 15 minutes. Coloured line at "C" with no other line was interpreted as non-reactive result. Coloured lines at "C" and "G" as IgG reactive; at "C" and "M" as IgM reactive; at "C", "G" and "M" as IgG and IgM reactive results. Tests were considered invalid if coloured line failed to appear at "C".

#### **Results**

To determine the seroprevalence of IgG or IgM antibodies against scrub typhus serum samples from 100 febrile patients were tested. The age in present study ranged from 8 months to 62 years. The age wise distribution of patients with febrile illness is shown in figure1. Majority of the cases belonged to 19-35 years age group. Paediatric population i.e. less than 18 years of age, constituted 33% of the total subjects tested for scrub typhus. The male to female ratio was 0.52. Figure 2 depicts the ward wise distribution of patients with febrile illness. Out of 100 patients, the serum samples of 5% were reactive for IgG or IgM antibodies to members of *O.tsutsugamushi* species. In 3% of the febrile patients only IgG antibodies

and in 1% only IgM antibodies were observed. One case demonstrated both IgG and IgM antibodies in her sera. All the cases with antibodies against scrub typhus presented to the Medicine ward of the hospital. Majority (80%) of these patients with circulating antibodies to members of *O.tutsugamushi* species were females.

### Discussion

As per World Health Organization, “Scrub typhus is probably one of the most underdiagnosed and under-reported febrile illnesses requiring hospitalization”.<sup>15</sup> Scrub typhus may prove to be life threatening if not timely treated. In the present study, the seropositivity for scrub typhus in febrile patients was 5%. Our findings are in line with another study that has reported 3.5% seropositivity for scrub typhus in their five year study involving cases of fever of unknown origin. Same study has further reported an increased seropositivity of 16.1% for scrub typhus when the samples were collected from suspected cases of rickettsial infection.<sup>15</sup> Gupta N *et al.* in their study have reported a 14.4% positivity for scrub typhus among clinically suspected cases of scrub typhus.<sup>16</sup> Takhar RP *et al.* have reported 22.8% positivity of scrub typhus infection among acute febrile illness cases. This study was conducted during the time of an outbreak of scrub typhus in the concerned region that might have resulted in higher positivity for scrub typhus.<sup>17</sup>

In our study, majority (66%) of the patients with febrile illness were females. Rizvi M *et al.* have also documented a similar female preponderance among febrile patients.<sup>18</sup> Among the seropositive cases for scrub typhus, the trend of majority being female patients was continued in the present study. It was in concordance with the study by Takhar RP *et al.*<sup>17</sup> However, Gupta N *et al.* have reported the distribution of detected scrub typhus cases almost equally among both the sexes.<sup>16</sup> In the present study, 80%

of the seropositive scrub typhus cases were in the 20-50 years age group, which is comparable to the study that has reported 73.6% of the detected scrub typhus cases belonging to 21–40 years age group.<sup>18</sup> In our study none of the detected scrub typhus cases belonged to the paediatric age group. However, another study has observed six out of 33 diagnosed scrub typhus cases belonging to the paediatric age group.<sup>16</sup>

### Conclusion

Scrub typhus still remains a neglected infectious disease despite its re-emergence in recent times. The similar non-specific clinical presentation, co-endemicity and overlapping seasonal trends with other vector borne illnesses like dengue and malaria often lead to the under diagnosis of scrub typhus in India. There is an urgent need to re-evaluate the burden of this treatable infection to aid the clinicians and policy makers in the timely and effective management of scrub typhus.

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Legends of Figure

Figure 1: Age and gender wise distribution of patients with febrile illness (n=100)

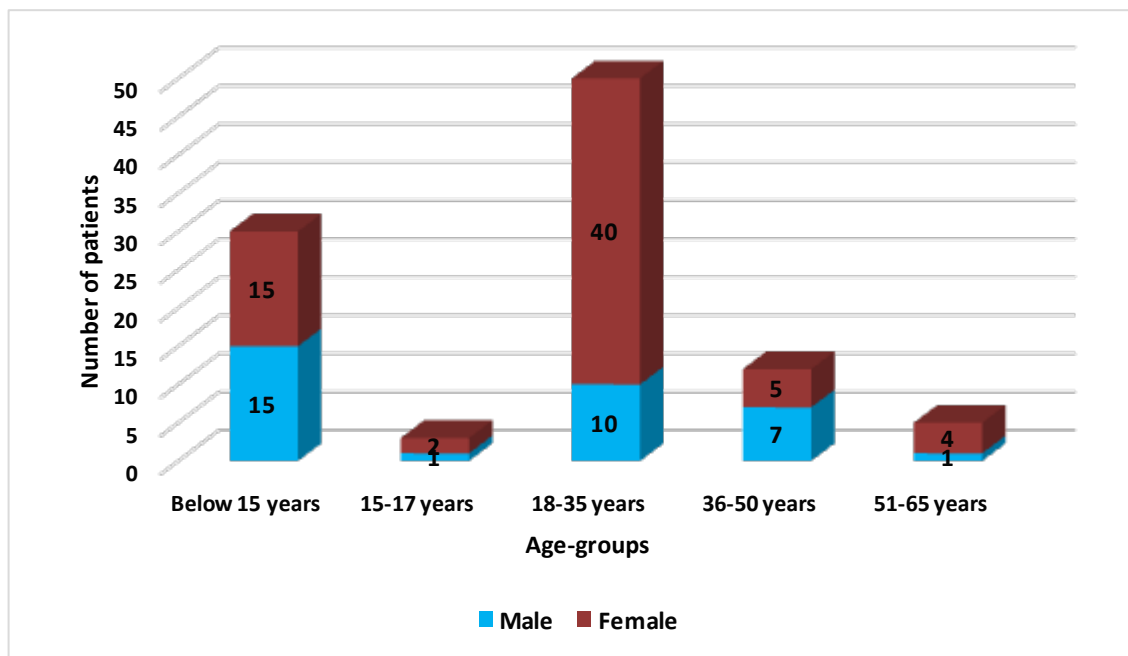


Figure 2: Ward wise distribution of patients with febrile illness (n=100)

