

## Outbreak of scrub typhus in central India

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### Abstract

**Introduction:** In recent years, outbreaks have been reported in the Sub-Himalayan belt as well as in Maharashtra, Rajasthan, Punjab and southern Indian states of Tamil Nadu, Kerala and Karnataka. Many cases were referred by clinicians for the laboratory diagnosis of scrub typhus in a shorter duration to Microbiology department.

**Objective:** To investigate the outbreak of scrub typhus in Yavatmal.

**Materials and Methods:** This cross-sectional study was conducted from September 2018 to February 2019 in Department of Microbiology, Shri Vasantrya Naik Government Medical College, Yavatmal. 275 samples were collected from the suspected cases of scrub typhus. The samples of suspected cases who were negative for malaria, typhoid and dengue sent by clinicians for the diagnosis of scrub typhus to Microbiology department. The study was approved by Institutional Ethics Committee. The Immunochromatographic test (ICT) for scrub typhus-SD Biosensor Tsutsugamushi, One step scrub typhus antibody test was used. Data was analyzed by statistical software EpiInfo™ Version 7.

**Results:** Out of 275, 75(27.3%) were positive by Immunochromatographic test (ICT) to diagnose scrub typhus and 200(72.7%) were negative. Maximum number of positive patients, 59(32.8%) were in the month of September 2018. Maximum number of positive patients, 28(21.9%) were from the age group of 21-40 years. Females 54(32.3%) and from rural area 66(28.2%) were more affected by scrub typhus. Out of 75 positive patients, eschar was found in the 4 patients (5.3%).

**Conclusion:** To conclude, there was outbreak of scrub typhus in Yavatmal district as compared to the figures of last three years.

**Keywords:** Outbreak, Scrub typhus, Immunochromatographic test (ICT)

### Introduction

Rickettsial diseases are considered as emerging and re-emerging diseases in India<sup>1-5</sup> and remains underdiagnosed.<sup>6</sup> Scrub typhus is the commonest occurring rickettsial infection in India<sup>1</sup> which is a vector-borne rickettsial disease that is caused by the obligate intracellular bacterium *Orientia tsutsugamushi*.<sup>7,8</sup> The disease is transmitted by larval trombiculid mite (chiggers) and crop fields are an important reservoir for transmission. In India, the first case of scrub typhus was reported in 2009 from Kerala.<sup>9</sup> In recent years, outbreaks have been reported in the Sub-Himalayan belt as well as in Maharashtra, Rajasthan, Punjab and southern Indian states of Tamil Nadu, Kerala and Karnataka.<sup>10</sup> Mortality rates due to scrub typhus infection approaching 30% are reported.<sup>9,11</sup> Serious complications of scrub typhus are pneumonia, myocarditis, meningoencephalitis, acute renal failure and gastrointestinal bleeding.<sup>6</sup> Immunochromatographic test (ICT) is a rapid diagnostic test for scrub typhus infection which had high specificity 100% but low sensitivity 38%.<sup>2</sup>

Literature review suggested that very few studies<sup>2,6,10,11,12</sup> were reported of scrub typhus infection from India. Main occupation of rural area is farming and forestry is in Yavatmal district. Along with these, the climate is favorable in Yavatmal district for the larval trombiculid mite which spread the scrub typhus infection. Suddenly in month of September 2018 many suspected cases for scrub typhus were referred by clinicians for the laboratory diagnosis of scrub typhus to Microbiology department and then goes on decreasing. In view of this background a study

is planned to undertake with the objective to investigate the outbreak of scrub typhus in Yavatmal.

### Material and Methods

**Study design:** This cross-sectional study was conducted from Sept 2018 to Feb 2019.

**Study site:** Department of Microbiology of Shri Vasantrya Naik Government Medical College, Yavatmal.

**Sample Size:** 275 samples were collected from the suspected cases of scrub typhus.

**Study population:** The samples of suspected cases who were negative for malaria, typhoid and dengue sent by clinicians for the diagnosis of scrub typhus.

**Ethical Approval:** The study was approved by Institutional Ethics Committee.

**Data collection:** A predesigned questionnaire was used for data collection including age, sex, residence, clinical findings, results of Immunochromatographic test for scrub typhus.

**Procedure:** The ICT for scrub typhus-SD Biosensor Tsutsugamushi, One step scrub typhus antibody test was used.<sup>2</sup> As per the manufacturer's instructions, the test was performed and interpreted.

**Statistical analysis:** Data was entered in Microsoft excel sheet and analyzed by statistical software EpiInfo™ Version 7 (Atlanta, Georgia, USA) for frequencies, percentages.

### Results

Total 275 suspected cases of scrub typhus were received for the laboratory diagnosis. Out of 275, 75(27.3%) were

positive by Immunochromatographic test to diagnose scrub typhus and 200(72.7%) were negative.(Table 1).

The patients were started to admit in our hospital from September 2018. As per our study period, we analyzed the cases till February 2019. Maximum number of suspected 180(65.5%) and positive 59(32.8%) patients, were in the month of September 2018 whereas minimum number of suspected 3(1.1%) and no positive patients, were in the month of February 2019. (Table 2)(Fig. 1).

The most of the patients, 128(46.5%) were from the age group of 21-40 years, followed by 72(26.2%) were from the age group of 1-20 years and minimum number of patients, 20(7.3%) were from the age group of 61-80 years. The minimum age of the patient was 1 year and maximum age of

patient was 78 years. Out of all positive patients for the scrub typhus, maximum number of positive patients, 28(21.9%) were from the age group of 21-40 years and minimum number of positive patients, 8(40%) were from the age group of 61-80 years.(Table 3).

Of 167(60.7%) females, 54(32.3%) were positive whereas of 108(39.3%) males, 21(19.4%) were positive for the scrub typhus.(Table 4). Of 234(85.1%) rural patients, 66(28.2%) were positive and of 41(14.9%) urban patients, 9(22%) were positive for the scrub typhus (Table 5). Out of 75 positive patients, eschar was found in the 4 patients (5.3%).

**Table 1:** Results of total samples of suspected cases of scrub typhus

Total samples	Positive by Rapid test	Negative by Rapid test
275(100)	75(27.3)	200(72.7)

(Figures in parenthesis denote percentages)

**Table 2:** Monthwise distribution of total suspected cases of scrub typhus

Month	Result by Rapid test for scrub typhus		Total
	Positive	Negative	
Sept-18	59(32.8)	121(67.2)	180(65.5)
Oct-18	15(23.4)	49(76.6)	64(23.3)
Nov-18	0(0)	15(100)	15(5.5)
Dec-18	0(0)	9(100)	9(3.3)
Jan-19	1(25)	3(75)	4(1.5)
Feb-19	0(0)	3(100)	3(1.1)
Total	75(27.3)	200(72.7)	275(100)

(Figures in parenthesis denote percentages)

**Table 3:** Agewise distribution of total suspected cases of scrub typhus

Age group(Years)	Result by Rapid test for scrub typhus		Total
	Positive	Negative	
1-20	15(20.8)	57(79.2)	72(26.2)
21-40	28(21.9)	100(78.1)	128(46.5)
41-60	24(43.6)	31(56.4)	55(20)
61-80	8(40)	12(60)	20(7.3)
Total	75(27.3)	200(72.7)	275(100)

(Figures in parenthesis denote percentages)

**Table 4:** Sexwise distribution of total suspected cases of scrub typhus

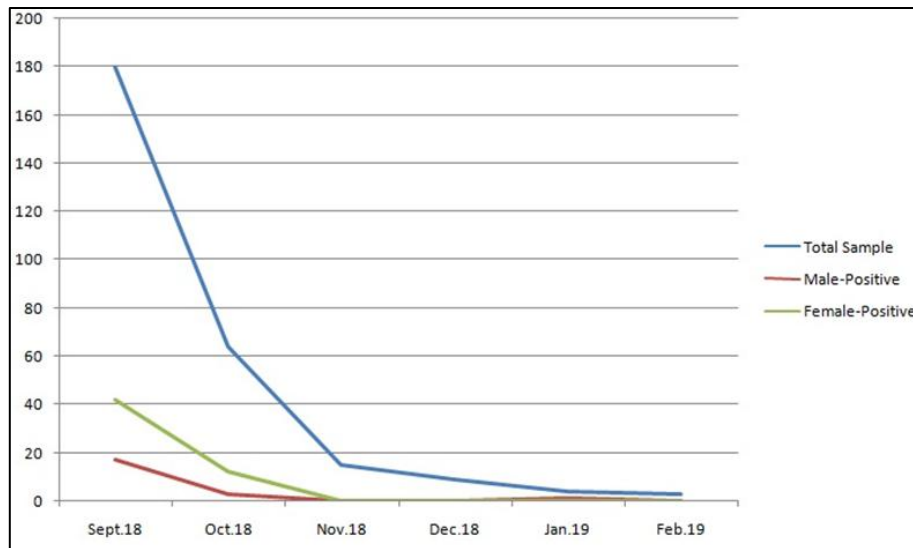
Sex	Result by Rapid test for scrub typhus		Total
	Positive	Negative	
Female	54(32.3)	113(67.7)	167(60.7)
Male	21(19.4)	87(80.6)	108(39.3)
Total	75(27.3)	200(72.7)	275(100)

(Figures in parenthesis denote percentages)

**Table 5:** Residence wise distribution of total suspected cases of scrub typhus

Residence	Result by Rapid test for scrub typhus		Total
	Positive	Negative	
Rural	66(28.2)	168(71.8)	234(85.1)
Urban	9(22)	32(78)	41(14.9)
Total	75(27.3)	200(72.7)	275(100)

(Figures in parenthesis denote percentages)



**Fig. 1:** Monthwise distribution of total samples, positive male and female patients

### Discussion

The objective of present study was to investigate the outbreak of scrub typhus in Yavatmal. In our study, the 27.3% cases of scrub typhus were positive by Immunochromatographic test for scrub typhus. This was the maximum number of positive cases of scrub typhus as compared to last three years because there was not a single positive case of scrub typhus in our hospital in last three years. Similar findings to our study, Sinha P et al<sup>6</sup> reported 24.7% patients were diagnosed to have scrub typhus by ICT. Contrary to our findings, Pote K et al<sup>2</sup> reported 5.2% positive patients for scrub typhus by ICT. Ramyasree A et al<sup>12</sup> reported 39% patients were positive for scrub typhus by rapid method. Kalal BS et al<sup>10</sup> reported 85.5% patients were positive for scrub typhus by ICT.

In our study, maximum patients 32.8% were positive in the month of September 2018, later on the positive rate of patients was decreasing. Similar findings to our study, Dorji K et al<sup>7</sup> reported the 97% cases of scrub typhus observed between June and November, peaking in the September. Kalal BS et al<sup>10</sup> reported the seasonal trend, most of the cases, 53% were seen soon after the rainy season during the month of August to November. Compared to our study, Gautam R et al<sup>13</sup> conducted the study for one year in Central Nepal in which they reported the seasonal variation of scrub typhus patients and most commonly diagnosed during the month of July (43.6%) followed by September (35.4%). This difference might be due to the different geographical setting and difference in the environment.

Regarding age distribution of scrub typhus, most of the patients, 21.9% were from the 21-40 years of age group in our study. Similar findings to our study, Dorji K et al<sup>7</sup> showed the highest percentages of scrub typhus cases in the 21-40 years of age group. Rajendra PT et al<sup>9</sup> showed the highest percentage of scrub typhus cases in 21-50 years of age group. Contrast findings to our study, Pote K et al<sup>2</sup> reported the maximum positive patients, 18.5% were in the age group of 10 years and less. Gautam R et al<sup>13</sup> revealed

the most number of patients, 28.5% were in the age group of 51-60 years. Ramyasree A et al<sup>12</sup> showed that highest prevalence, 77.7% of scrub typhus cases in their study in 40-49 years. In our study, the reason for the maximum number of patients was infected for scrub typhus might be due to working population age group.

The 32.3% females were scrub typhus positive in our study. Similar findings to our study, Gautam R et al<sup>13</sup> reported the highest seroprevalence of scrub typhus in females (29.1%). Dorji K et al<sup>7</sup> showed the female preponderance (51.3%) in their study about positivity of scrub typhus. Rajendra PT et al<sup>9</sup> reported (63.3%) female were positive for scrub typhus. Contrast to our findings, Ramyasree A et al<sup>12</sup> revealed the same proportion of positive cases in both sexes. The female preponderance were more in our study. This could probably because males mostly go in cities for non-agricultural work and females look after the agricultural work in Yavatmal district.

In the present study, 28.2% positive patients from rural area. Similarly, Dorji K et al,<sup>7</sup> Rajendra PT et al,<sup>9</sup> Gautam R et al<sup>13</sup> and Lijuan Z et al<sup>14</sup> reported the most of patients from rural area were acquired scrub typhus infection. This might be due to the larval trombiculid mite is the found in the grassland and in the farms.

To conclude, there was outbreak of scrub typhus in Yavatmal district as compared to the figures of last three years. The most of cases were in the month of September and from rural area. Females and 21-40 years of age group were most affected.

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**Conflict of Interest:** None.

## References

1. Rahi M, Gupte MD, Bhargava A, Varghese GM, Arora R. DHR-ICMR Guidelines for diagnosis & management of Rickettsial diseases in India. *Indian J Med Res* 2015;141(4):417-22.
2. Pote K, Narang R, Deshmukh P. Diagnostic performance of serological tests to detect antibodies against acute scrub typhus infection in central India. *Indian J Med Microbiol* 2018;36:108-12.
3. Gurung S, Pradhan J, Bhutia PY. Outbreak of scrub typhus in North East Himalayan region-Sikkim: An emerging threat. *Indian J Med Microbiol* 2013;31:72-4.
4. Kamarasu K, Malathi M, Rajagopal V, Subramani K, Jagadeeshramasamy D, Mathai E, et al. serological evidence for wide distribution of spotted fever and typhus fever in Tamil Nadu. *Indian J Med Res* 2007;126:128-30.
5. Mittal V, Gupta N, Bhattacharya D, Kumar K, Ichhpujani RL, Singh S, et al. Serological evidence of Rickettsial Infections in Delhi. *Indian J Med Res* 2012;135:538-41.
6. 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.
7. Dorji K, Phuentshok Y, Zangpo T, Dorjee S, Dorjee C, Jolly P. Clinical and Epidemiological Patterns of Scrub Typhus, an Emerging Disease in Bhutan. *Trop Med Infect Dis* 2019;4(2)pii: E56.
8. Tantibhedhyangkul W, Wongsawat E, Silpasakorn S, Waywa D, Saenyasiri N, Suesuay J et al. Use of multiplex real-time PCR to diagnose scrub typhus. *J Clin Microbiol* 2017; 55:1377-1387.
9. Rajendra PT, Moti LB, Savita A, Nitin M, Arif M. Scrub typhus: A prospective, observational study during an outbreak in Rajasthan, India. *Natl Med J India* 2017;30(2):69-2.
10. Kalal BS, Puranik P, Nagaraj S, Rego S, Shet A. Scrub typhus and spotted fever among hospitalised children in South India: Clinical profile and serological epidemiology. *Indian J Med Microbiol* 2016;34:293-8
11. Prakash JA, Kavitha ML, Mathai E. Nested polymerase chain reaction on blood clots for gene encoding 56 kDa antigen and serology for the diagnosis of scrub typhus. *Indian J Med Microbiol* 2011;29(1):47-50.
12. Ramyasree A, Kalawat U, Rani N D, Chaudhury A. Seroprevalence of Scrub typhus at a tertiary care hospital in Andhra Pradesh. *Indian J Med Microbiol* 2015;33:68-72.
13. Gautam R, Parajuli K, Sherchand JB. Epidemiology, Risk Factors and Seasonal Variation of Scrub Typhus Fever in Central Nepal. *Trop Med Infect Dis* 2019;4(1). pii: E27.
14. Lijuan Z, Si H, Yuming J, Liang L, Xuemei L, Lianying L, et al. A rapid, sensitive and reliable diagnostic test for scrub typhus in China. *Indian J Med Microbiol* 2011;29(4):368-71.

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