Vol 4 | Issue 1 | January - March | 2024

ORIGINAL ARTICLE - PUBLIC HEALTH

TREND OF SCRUB TYPHUS IN TAMIL NADU – 2021-2023 (BASED ON IHIP DATA)

AvudaiSelvi Rathinasamy [(1)], Amudha [(1)], SankarmaniRamasamy [(1)] , Mathivanan [(1)], SudhakarThangarasu [(1)], Vimalkumar Elangovan [(1)], Krishnaveni P [(1)], Srinivasan K [(1)] Gurunathan V [(1)], Balamurugan M [(1)], Senthil Kumar M [(1)] , SomasundaramA [(1)],Vadivelan P [(1)], Selvavinayagam T S [(1)]

(1) Directorate of Public Health and Preventive Medicine, Tamil Nadu

Abstract

INTRODUCTION : Scrub typhus is a well-known zoonotic disease and it is also a neglected tropical disease. It was once thought to be a disease of rural origin but widely distributed in the recent past which has become a major public health problem.

OBJECTIVE : To analyse the epidemiological profile of Scrub typhus in Tamil Nadu.

METHODS : It's a descriptive cross-sectional study using secondary data of 35662 samples from IHIP-IDSP portal between 2021 and 2023. The collected data was analysed using SPSS-16 and QGIS-3.34.Data were expressed as tables, charts and maps.

RESULTS : Among the sample tested, 1746 were positive for Scrub typhus with positivity rate of 4.8% and equal distribution between genders. The prevalence was similar between 1 and 60 age group but maximum hospitalisation was observed in children less than 10 years. The prevalence of cases was found throughout the year in most districts with peaks between July and March.

CONCLUSION : Scrub typhus has become a re-emerging disease of public health importance. From being a disease of monsoon and post monsoon trend it has become endemic in most districts with sporadic outbreaks. More field studies and holistic approach involving intersectoral coordination and implementation of One Health is crucial to prevent any

INTRODUCTION

Scrub typhus is an acute febrile illness that affects multiple organ systems and results in significant morbidity and mortality. It is a zoonotic infection caused by an obligate intracellular bacteria Orientia tsutsugamushi, transmitted to humans by the bite of mite (Chiggers) belongs to the family Trombiculidae , species Leptotrombidium deliense.[1] It is responsible for fatal tropical infection and is a disease of public health importance in India.[2] The agents causing this infection belong to the Order Rickettsiales, that comprises of the family Anaplasmataceae and Rickettsiaceae. Of these rickettsioses are caused by bacteria belonging to the genus Rickettsia, while scrub typhus is due to Orientia spp.[3]

The Incidence of Scrub typhus is commonly reported in Asia-Pacific region. It is endemic in India, Korea, China, Taiwan, Japan, Pakistan, Thailand, Laos, Malaysia, Vietnam, Sri Lanka, and Australia. In 1999, the World Health Organization listed scrub typhus as one of the most underdiagnosed and underreported causes of febrile illness in the Asian region. The majority of cases of scrub typhus occur in rural areas where mite-harbouring vegetation is common. Most of the studies have described focal areas of scrub vegetation as small as a few square meters that are infested with these mites becomes hot spots, their risk of disease increases dramatically.[4]

In recent years there has been a resurgence of scrub typhus across India. Scrub typhus has re-emerged as a major cause of acute undifferentiated febrile illnesses (AUFI) with high morbidity and mortality.[5,6] It is known to occur in diverse ecological settings in India with more numbers of cases being reported from Tamil Nadu, Andhra Pradesh, Karnataka, and Kerala in the South, Himachal Pradesh, Uttaranchal, Jammu, and Kashmir in the North, Meghalaya, Assam, and Nagaland in the North-East, West Bengal and Bihar in the East, and Maharashtra and Rajasthan in the West.[7]

In the temperate zones transmission is seasonal, whereas in tropical areas transmission occurs throughout the year and it is influenced by rainfall which may be the reason

Please Scan this QR Code to View this Article Online
Article ID: 2024:04:02:12
Corresponding Author: AvudaiSelvi Rathinasamy
e-mail : skyblue4616@gmail.com

for clustering of cases during the rainy season(8) But the outbreaks have been reported during the winter season in southern parts of India.[9]

The clinical manifestation begins few days after chigger bite. A necrotic eschar may be noted at the inoculating site of the mite. This finding is pathognomonic of the disease in endemic settings. It begins as a papule and later ulcerates to form a black crust like a skin burn from a cigarette.[7] Eschars can be missed in dark skinned individuals. They are mostly found in covered locations such as groins, axilla etc[10] In absence of characteristic eschar, it is difficult to clinically suspect scrub typhus. Similar to many other febrile illnesses, this disease is characterized by non-specific features like fever, rash, headache, dyspnea, lymphadenopathy and organomegaly which pose a significant challenge to the treating physicians. Therefore, high index of suspicion and early use of appropriate diagnostic test is very important to prevent fatalities.[11] With the above knowledge this study was planned to estimate the prevalence of Scrub typhus in Tamil Nadu and analyse the epidemiological factors of the disease in the state.

METHODOLOGY

This is a retrospective study with secondary data analysis of the scrub typhus cases. The Scrub typhus reported data was collected from Integrated Disease Surveillance Programme under Integrated Health Information Portal. The data included in this study was the samples tested at District Public Health Laboratories of Tamil Nadu from June 2021 – December 2023. Official permission to conduct this study was obtained from the Director of Public Health and Preventive Medicine (DPH&PM), Tamil Nadu. The line listing format includes information on name, age, sex, address, date of diagnosis, and the patient care (in-patient or out- patient). The IDSP IHIP data were collected from all Government Primary health centers (PHCs), Community health centers (CHCs) and District hospitals (DHs). The details of the patients were not disclosed in this study.

Diagnosis was by standard IgM ELISA for Scrub typhus, which uses recombinant p56kD type specific antigens of Orientia tsutsugamushi Karp, Kato, Gilliam, and TA716 strains.

Based on the line listing data of Rickettsial infections during the study period, a preliminary analysis was carried out by SPSS software (version 16.0). Age was grouped into 10 categories with class interval of 10. District wise prevalence of Scrub typhus was analysed and interpreted using mapping by QGIS software (version 3.34).

RESULTS

In Tamil Nadu currently there are 38 DPHLs functioning one in each of the 38 districts. A total of 35,761 patient'ssamples were tested during the study period out of which 99 samples were invalid, they were either haemolysed or insufficient sample.

Finally,35662 samples were included in this study and the positivity rate was 4.8% (1746). Further analysis was carried out for 1746 positive samples. The mean age of patient was 34.5 ± 20.2 years and the positivity rate was equally distributed in both the genders. (Table 1)

Table 1: Gender wise prevalence of Scrub typhus in Tamil Nadu (2021-2023)

Gender	Negative	Positive	Total	Prevalence (%)	95% CI
Female	18443	948	19391	4.8%	4.59 to 5.20
Male	15462	798	16260	4.9%	4.58 to 5.25
Transgender	11	0	11	0%	0
Total	**33916**	**1746**	**35662**	**4.8%**	**4.67 to 5.12**

Among the 1,746 patients reported positive, 577 patients were hospitalised. Among those hospitalized, about 19% (115) belongs to the age group of 1 -10 years.

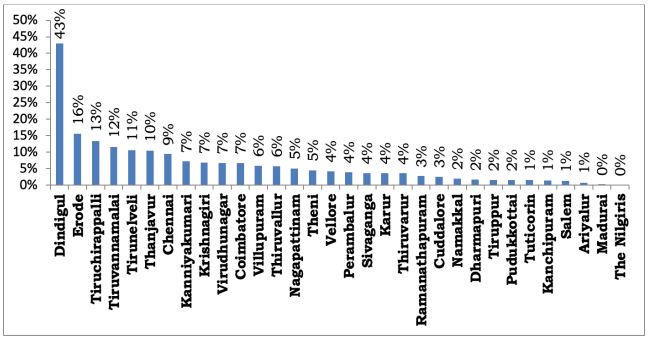

Figure 1: District-wise positivity rate for Scrub typhus in Tamil Nadu.

The positivity rate of the samples tested is presented in the Figure 1. Highest positivity rate was observed in Dindigul district with 43% and least was observed in Madurai and The Nilgiris with 0%.

Table 2 : Age-sex distribution of Scrub typhus cases in Tamil Nadu (2021- 2023)

Age Grouping	IPD			OPD			Grand Total
	Female	Male	Total	Female	Male	Total	
<10 years	52	63	**115**	74	54	**128**	**243**
11-20 years	30	58	**88**	98	106	**204**	**292**
21- 30 years	53	26	**79**	117	65	**182**	**261**
31-40 years	28	32	**60**	111	79	**190**	**250**
41-50 years	51	34	**85**	94	74	**168**	**253**
51-60 years	38	28	**66**	83	66	**149**	**215**
61-70 years	26	33	**59**	61	48	**109**	**168**
71-80 years	10	9	**19**	16	17	**33**	**52**
81-90 years	3	3	**6**	2	3	**5**	**11**
> 90 years	0	0	**0**	1	0	**1**	**1**
Grand Total	**291**	**286**	**577**	**657**	**512**	**1169**	**1746**

Seasonal clustering of cases was observed. The incidence of cases started to increase from September to December of the study period and falling back to normal by February. (Figure:2)

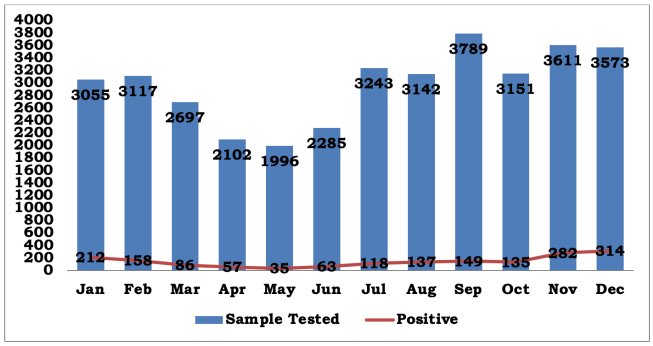

Figure 2 : Graph representing Cumulative test done to positives Month-wise for Scrub typhus cases in Tamil Nadu

Figure 3 demonstrates the mont-wise distribution of Scrub typhus in Tamil Nadu for three years. There was 7 reported outbreaks of Scrub typhus. Most outbreaks were reported during the surge of cases or when there was a fall in cases. In 2021 outbreaks were reported in Dindigul and Thanjavur districts. In 2022 outbreaks were reported in Thanjavur, Krishnagiri, Virudhunagar.

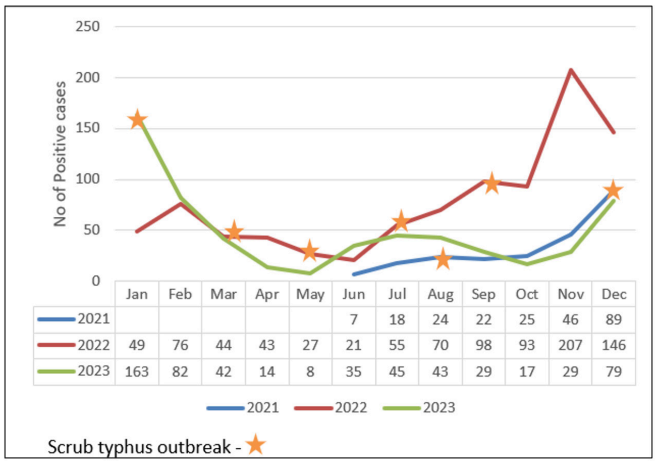

Figure 3 : Year and Month wise incidence of Scrub typhus cases in Tamil Nadu – 2021 – 2023 with outbreaks reported

The distribution of Scrub typhus cases in all districts for 3 years were represented in the Figure 4. Scrub typhus is endemic in following districts such as Chennai , Kanchipuram, Ranipet , Krishnagiri and Kanniyakumari reported Scrub typhus throughout the study period (2021 -2023). Recently incidence was higher in the Nilgiris , Chengalpattu, Thoothukudi and Tirunelveli.

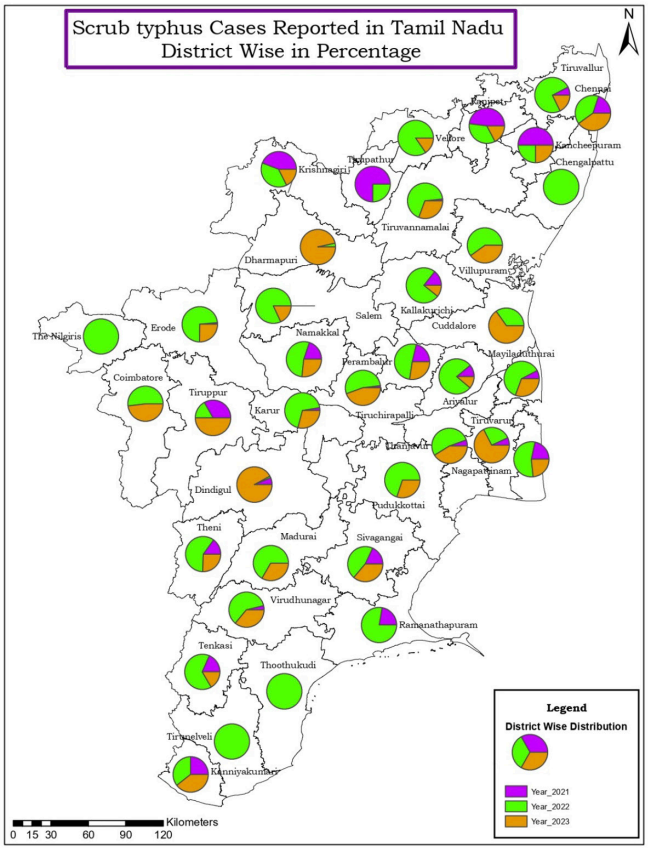

Figure 4 : District wise Distribution of Scrub typhus cases in Tamil Nadu – 2021 -2023.

DISCUSSION

Scrub typhus has been prevalent in India for quite a while and due to recent advances it was not a major public health burden for over decades. In several discussions and forums it has been in lime light as an important neglected tropical disease. Recently the incidence of Scrub typhus has been in increasing trend. The major burden was seen in rural areas with increased vegetation with domestic and wild animal habitations. But our study has come up with finding of cases throughout the state both in urban and rural which could be due to rapid urbanisation and climate change.

Our study involved 35622 cases who were suspected to be suffering Scrub typhus and the test positivity rate was 4.8% which is much less when compared to study conducted in Delhi by C.K.Thakur et al, in south India by Chrispal A.et al and in Goa by Narvencar KPS et al. The difference in test positivity in our study could be due to a community based study rather than hospital based study in other studies.

The incidence of Scrub typhus was similar in proportion in both genders in our study. Similar findings were also observed in studies conducted by Soloman D' Cruz et al in Northern Tamil Nadu, George M et al in Andhra Pradesh and in Delhi by C.K.Thakur et al. In contrast the

study in China conducted by Pei-Ying Peng et al showed increased prevalence was observed in female. This difference in the finding could be due to geography of the location and nature of the job by the individual. In India agriculture work including cattle rearing is equally shared among the gender, which could influence the finding of equal distribution.

The prevalence of cases was evenly distributed between ages from 1-60 years and the prevalence decreased in elderly more than 60 years of age. The above finding was inconsistence with finding from other studies conducted by Pei-Ying Peng et al where the incidence in higher above 40 years of age. Taking into consideration, the severity of the disease, majority of IP admission was sought for cases less than 10 years of age. The above finding could be due to the highest health seeking behaviour of parents towards the children rather than for the adults which is similar to the study conducted in South Odisha by Akash Panigrahi et al.

Seasonal trend had an influence in the prevalence of Scrub typhus in our study. It was observed that the cases started to increase from the month of July and peaked at November and December, followed by decline in cases by February. Similar findings of seasonal trend was observed in study by C.K.Thakur et al, George M et al and Soloman D' Cruz et al. These findings could be due to the monsoon and post monsoon effect leading to migration of animals and vectors to favourable environment. Climate change due to global warming has led to prevalence of cases throughout the year which was not common a decade ago.

Outbreaks due to Scrub typhus occurred sporadically in different districts through the year. Outbreak did not follow any seasonal trend and it occurred even when the case load was minimal. In contrast to our findings, several studies highlighted that outbreaks were more common during monsoon and post monsoon in study conducted by Meghnath D et al and Pei-Ying Peng et al . This change could be due to climate change and environmental modification which leads to human animal conflicts due to migration and geographical variation.

The number of cases reported in 2021 was less compared to 2022 and 2023 and only in selected pockets of Tamil Nadu. This could be due to the effect of COVID -19 pandemic which imposed lockdown and restricted movements of people. Following which in 2022 Scrub typhus cases were reported through the state with maximum number of outbreaks during the study period. This probably could be due to the sudden exposure and triggering between the epidemiological triad of agent host and vector. Since 2023 Scrub typhus has become endemic to all districts throughout the year. The Only exception in the findings was in The Nilgiris and Madurai district. The probable reason for very low positivity at Nilgiris district could be due to low temperature which does not favour the growth of ticks while Madurai district probably could be free from agent or less agent and vector.

CONCLUSION

In conclusion our study has provided valuable insights on district wise epidemiological data of Scrub typhus in Tamil Nadu, which can help in public health decisions at the district and state level. The seasonal variations can be used with data's from the Meteorological department to study the impact of climate change on vector borne diseases. These valuable inputs can be incorporated with data's obtained during intersectoral coordination for development of a One Health Directorate to combat the future events and outbreaks.

REFERENCES

1. Watt G. Parola P. Scrub typhus and tropical Rickettsioses. Curr Opin Infect Dis 2003; 16 : 429-36.

2. Behera B, Biswal M, Das RR, Dey A, Jena J, Dhal S, et al. Clinico-epidemiological analysis of scrub typhus in hospitalised patients presenting with acute undifferentiated febrile illness: A hospital-based study from Eastern India. Indian J Med Microbiol. 2019 Apr-Jun; 37(2):278–280. https://doi.org/10. 4103/ijmm.IJMM_19_147 PMID: 31745031.

3. Luce-Fedrow, A. et al. Strategies for detecting rickettsiae and diagnosing rickettsial diseases. Future Microbiol. 10(4), 537–564 (2015).

4. https://www.cdc.gov/typhus/healthcare-providers/index.html.

5. Kispotta R, Kasinathan A, Kumar Kommu PP, Manikandan M. Analysis of 262 Children with Scrub
Typhus Infection: A Single-Center Experience. Am J Trop Med Hyg. 2020 Nov 9. https://doi.org/10.
4269/ajtmh.20-1019 Epub ahead of print. PMID: 33219642.

6.Varghese GM, Trowbridge P, Janardhanan J, Thomas K, Peter JV, Mathews P, Abrahamet al. Clinical
profile and improving mortality trend of scrub typhus in South India. Int J Infect Dis. 2014 Jun; 23:39–
43. https://doi.org/10.1016/j.ijid.2014.02.009 Epub 2014 Mar

21. PMID: 24661931.

7. Xu G, Walker DH, Jupiter D, Melby PC, Arcari CM. A review of the global epidemiology of scrub typhus.
PLoS Negl Trop Dis. 2017 Nov 3; 11(11):e0006062. https://doi.org/10.1371/journal.pntd.0006062
PMID: 29099844; PMCID: PMC5687757.

8. Gurung S, Pradhan J, Bhutia PY. Outbreak of scrub typhus in the North East Himalayan region-Sikkim: An emergingthreat. Indian J Med Microbiol. 2013;31:72–4. [PubMed] [Google Scholar]

9. Liu YX, Feng D, Suo JJ, Xing YB, Liu G, Liu LH, et al. Clinical characteristics of the autumn-winter type scrub typhuscases in South of Shandong province, Northern China. BMC Infect Dis. 2009;9:82. [PMC free article] [PubMed] [GoogleScholar]

10. Kim DM, Won KJ, Park CY, Yu KD, Kim HS, Yang TY, et al. Distribution of eschars on the body of scrub typhus patients: a prospective study. Am J Trop Med Hyg 2007; 76:806–9.

11. Peter JV, Sudarsan TI, Prakash JAJ, Varghese GM. Severe scrub typhus infection: Clinical features, diagnostic challenges and management. World J Crit care Med [Internet]. 2015 [cited 2024 Feb 28];4(3):244. Available from: https://pubmed.ncbi.nlm.nih.gov/26261776/

12. Kala D, Gupta S, Nagraik R, Verma V, Thakur A, Kaushal A. Diagnosis of scrub typhus: recent advancements and challenges. 3 Biotech [Internet]. 2020 Sep 1 [cited 2024 Mar 21];10(9). Available from: /pmc/articles/PMC7431554/

13. Vanramliana, Pautu L, Lalmalsawma P, Rosangkima G, Sarma DK, Chinzah H, et al. Epidemiology of scrub typhus and other rickettsial infections (2018–22) in the hyper-endemic setting of Mizoram, North-East India. PLoS Negl Trop Dis [Internet]. 2023 Nov 1 [cited 2024 Feb 28];17(11):e0011688. Available from: https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0011688

14. Devasagayam E, Dayanand D, Kundu D, Kamath MS, Kirubakaran R, Varghese GM. The burden of scrub typhus in india: A systematic review. PLoS Negl Trop Dis [Internet]. 2021;15(7):1–15. Available from: http://dx.doi.org/10.1371/journal.pntd.0009619

15. Thakur CK, Chaudhry R, Gupta N, Vinayaraj E V., Singh V, Das BK, et al. Scrub typhus in patients with acute febrile illness: A 5-year study from India. Qjm. 2020;113(6):404–10.

16. Chrispal A, Boorugu H, Gopinath KG, Prakash JAJ, Chandy S, Abraham OC, et al. Scrub typhus: an unrecognized threat in South India - clinical profile and predictors of mortality. Trop Doct [Internet]. 2010 Jul [cited 2024 Mar 21];40(3):129–33. Available from: https://pubmed.ncbi.nlm.nih.gov/20360426/

17. Narvencar KPS, Rodrigue S, Nevrekar RP, Dias L, Dias A, Vaz M, et al. Scrub typhus in patients reporting with acute febrile illness at a tertiary health care institution in Goa. Indian J Med Res [Internet]. 2012 Dec [cited 2024 Mar 20];136(6):1020. Available from: /pmc/articles/PMC3612306/

18. D'Cruz S, Perumalla SK, Yuvaraj J, Prakash JAJ. Geography and prevalence of rickettsial infections in Northern Tamil Nadu, India: a cross-sectional study. Sci Rep [Internet]. 2022;12(1):1–9. Available from: https://doi.org/10.1038/s41598-022-21191-7

19. Peng PY, Duan HY, Xu L, Zhang LT, Sun JQ, Zu Y, et al. Epidemiologic changes of a longitudinal surveillance study spanning 51 years of scrub typhus in mainland China. Sci Rep [Internet]. 2024 Dec 1 [cited 2024 Mar 20];14(1):3138. Available from: https://pubmed.ncbi.nlm.nih.gov/38326459/

20. Panigrahi A, Narasimham M V., Biswal M, Bisht K, Mishra B, Parida B. Epidemiology of scrub typhus in a tertiary care hospital of Southern Odisha: a cross sectional study. Indian J Med Microbiol [Internet]. 2023 Mar 1 [cited 2024 Mar 20];42:92–6. Available from: https://pubmed.ncbi.nlm.nih.gov/36192256/

21. Dhimal M, Dumre SP, Sharma GN, Khanal P, Ranabhat K, Shah LP, et al. An outbreak investigation of scrub typhus in Nepal: confirmation of local transmission. BMC Infect Dis [Internet]. 2021 Dec 1 [cited 2024 Mar 20];21(1). Available from: /pmc/articles/PMC7893900/