

PRELIMINARY INVESTIGATION ON THE PREVALENCE OF SCRUB TYPHUS VECTORS IN KRISHNAGIRI DISTRICT, TAMIL NADU, INDIA

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ABSTRACT: A study on the vector prevalence of Scrub typhus was undertaken in the affected areas in the Krishnagiri district, Tamil Nadu. During this surveillance rodent species like *Rattus rattus* and *Rattus norvegicus* were trapped using the wonder traps. Results on the vectors of the scrub typhus revealed the presence of the vector mite *Leptotrombidium deliense* on the rats in 2 places. Chigger index (CI) was found out to be 0.17 which is not more than the critical limit. Observation of the vector of scrub typhus warrants regular surveillance in these areas to prevent any impending outbreak.

KEY WORDS: Scrub typhus, *Leptotrombidium deliense*, Krishnagiri, *Rattus rattus* and *Rattus norvegicus*.

INTRODUCTION

Ecto-parasites constitutes a major group of vectors, transmitting the causative agents of scrub typhus (mite borne) diseases, in addition to few other diseases of local and focal importance. Scrub typhus is also known as the tsutsugamushi disease is a rodent-borne zoonotic infection which is transmitted to human and rodents by the species of the trombiculid mites. Scrub typhus, a dreaded disease in pre-antibiotic era, is a militarily important disease that caused thousands of cases in the Far East during the Second World War. Soldiers were exposed to chigger bites in forest areas during the military operation. It is estimated that 36,000 soldiers were either incapacitated or died during World War II¹. The overall mortality varied from 7% to 9%. second onlv

to malaria among infectious diseases. Severe epidemics of the disease occurred among troops in Myanmar (Burma) and Sri Lanka (Ceylon) during World War II². Scrub typhus is essentially an occupational disease among rural residents in the Asia-Pacific region. Scrub typhus is difficult to recognize and diagnose because the symptoms and signs of the illness are often non-specific³.

Scrub typhus is prevalent in many parts of India and a re-emerging infectious disease in India⁴. It is known to occur all over India, including Southern India⁵ and Northern India⁶. There was a resurgence of the disease in 1990 in a unit of an army deployed at the Pakistan border of India⁷. The outbreaks were reported in areas located in the sub-Himalayan belt, from Jammu to Nagaland. There were reports of scrub typhus outbreaks

in Himachal Pradesh, Sikkim and Darjeeling (West Bengal) during 2003-2004 and 2007. Outbreaks of scrub typhus are reported in southern India during the cooler months of the year. Scrub typhus continues to persist in the cooler months in Puducherry and neighbouring Tamil Nadu with fever and myalgia as prominent features⁸. A community based study involving several districts in Tamil Nadu showed that scrub typhus and rickettsial diseases were widely distributed in the state^{9,10}. Serological evidence of scrub typhus cases were already reported from Krishnagiri district of Tamil Nadu from 2006-2007 onwards. Majority of the affected patients were agricultural workers (71%). These areas provide favourable ecological conditions for the propagation of haematophagous arthropods owing to richness in vegetation and animal activities¹¹. This study was undertaken in this scrub typhus disease reported areas. The joint rodent/vector mite surveillance was undertaken in these areas so as identify the vector responsible for this transmission and to recommend appropriate vector control strategy.

MATERIALS AND METHODS

Study Area

Krishnagiri district is blessed with the green valleys, hills and hillocks and inhabited by people known for innovative farming. This district is gifted with black granite hillocks and named as "krishnagiri". Krishnagiri district is bounded by Vellore and Thiruvannamalai districts in the East.

Karnataka state in the west, State of Andhra Pradesh in the North Dharmapuri district in the south. Its area is 5143 Sq. Kms. This district is elevated from 300m to 1400m above the mean sea level. It is located between 11° 12'N to 12° 49'N Latitude, 77° 27'E to 78° 38'E Longitude. Eastern part of the district experiences hot climate and Western part has a contrasting cold climate. The average rainfall is 830 mm per annum. March - June is summer season. July - November is Rainy Season and between December - February winter prevails.

Area Visited

Chattikanapalli and Mylaepalli villages nearby Sulagiri area as rural sampling sites, Gurupatti as semi Urban area and Hosur Government Hospital opposite area and TNSTC area as urban areas were selected for the study. The wonder traps were kept in different places placed of the rat dwelling locations and the rodents were collected using wonder traps. The traps were set at the fore mentioned sites present in the study areas. Traps were usually baited with fried foods such as pakoda & chappathis smeared with butter. Checking of traps was done early in the next morning. Traps were collected and transported to the laboratory. Rodents were anaesthetized / identified after recording their different morphological characteristics. Chigger mites typically attach firmly to the ears, thighs, or near the perianal areas of rodents. All the mites were carefully collected from the rodents and preserved in 70% alcohol. All preserved mites were later

mounted using clearing, dehydration and mounting procedure for identification using the standard method and the mites were

identified in the laboratory using standard identification keys and chigger index was calculated¹²⁻¹.

Table 1. Rodent / mites surveillance record Chattikanapalli and Mylaepalli villages nearby Sulagiri, Hosur Krishnagiri district, Tamil Nadu

S. No	Areas/Village	No. of trap used	Trap +ve %	No. of rodents	Rodent species trapped		No. of Chiggers
					<i>Rattus rattus</i>	<i>Rattus norvegicus</i>	
1	TNSTC area (Urban)	5	2	4	1	4	0
2	Government Hospital opposite area (Urban)	5	1	1			
3	Gurupatti (Semi Urban)	10	2	6	0	6	1
4	Chattianapalli (Rural)	5	1	5	5	2	2
5	Mylaepalli (Rural)	5	1	2			
Total		30	7	18	6	12	3

RESULTS AND DISCUSSION

A total of 30 wonder traps were placed in the study areas mentioned above to trap the rodents. The overall traps positivity rate was recorded as 23.33%. Locality wise trap positivity retrieved from the trapped rodents is given in the Table 1. Over all a total of 18 rodents were trapped comprised of 2 different species *Rattus rattus* and *Rattus norvegicus*. A total of 3 larval trombiculid mite chigger - *Leptotrombidium deliense* were collected from the rodents giving an overall chigger index as 0.17. Earlier studies revealed that chigger mites are habitat specific and found in abundance with forested terrain with long grasses¹⁶. Studies carried out in Himachal Pradesh during the outbreak of scrub typhus

in 2003 showed higher chigger index 2.46 and the habitat was conducive for harbouring / propagation of rodents and mites¹³. In a study conducted in Meghalaya which is an endemic area for scrub typhus, higher chigger index was recorded. The critical level of chigger load for a single case of scrub typhus i.e., 0.69 per rodent in Pescadores island of Taiwan was recorded¹⁷. This showed that there are trombiculid mite chigger *Leptotrombidium deliense* present in this area, in addition to the particular rodent species present to propagate the vector mites present for the transmission of scrub typhus.

This area is comparatively a wet area and the ecological situation highly supports the survival of chigger mites. Cases of scrub

typhus are reported among the low social-economic group distributed in this district of Tamil Nadu having characteristic terrain features supportive of scrub typhus. Infestation rate of rodents and vector *Leptotrombidium* mites support the transmission of scrub typhus in the area. Before the onset of transmission season early case detection through regular surveillance and laboratory diagnosis should be strengthened for the proper and early treatment of scrub typhus cases to prevent morbidity and mortality. Regular health education should be undertaken by the local health officials to the local masses about causation of this disease, vector mites responsible, its transmission cycle and seasonality, so that they can take the required preventive measures to curtail the transmission. People frequently visiting forest areas for their work may be advised to apply locally available repellents on their legs, arms and other exposed body parts to prevent mite bites for the prevention and control of the scrub typhus.

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