



Original Research Article

A study on Seroprevalance of Scrub typhus among clinically suspected patients by Rapid test

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A B S T R A C T

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Scrub typhus is a rickettsial infection also known as tsutsugamushi disease. It is caused by *Orientia tsutsugamushi*. The infection is called scrub typhus because it generally occurs after exposure to areas with secondary (scrub) vegetation. The climatic conditions in Andhra Pradesh are highly likely that the various infections prevalent. To study the seropositivity of Scrub Typhus, serum samples are received from clinically suspected cases of Scrub Typhus. Age and sex distribution of the seropositive patients are considered. This prospective study was conducted over a period of six months from October 2010 to April 2012 with following aims and objectives. During this period consecutive non repetitive 150 serum samples received from clinically suspected patients were tested for the presence of scrub typhus by SD Bioline Tsutsugamushi, One step scrub typhus antibody test. Among these scrub typhus test by Rapid test was positive in 58(38.6%) samples. Among scrub typhus positive samples 24% were from males and 14.6% from females. Our study findings are contrary to the belief. Therefore it is recommended that larger sample based studies may be taken up in which may throw better light on the seroprevalance and clinical presentations of Scrub typhus.

Introduction

Scrub typhus or Bush typhus is a form of typhus caused by *Orientia tsutsugamushi* first isolated and identified in 1930 in Japan

(Tseng et al 2008). Although it is similar in presentation to other forms of typhus, it is caused by an agent in a different genus, and

is frequently classified separately from the other typhi. Scrub typhus is transmitted by some species of trombiculid mites "chiggers", particularly a *Leptotrombidium deliense*, (Roberts, L. W., and D. M. Robinson. 1977) which are found in areas of heavy scrub vegetation. The bite of this mite leaves a characteristic black eschar that is useful to the doctor for making the diagnosis. Scrub typhus is endemic to a part of the world known as the "tsutsugamushi triangle" which extends from northern Japan and far-eastern Russia in the north, to the territories around the Solomon Sea into northern Australia in the south, and to Pakistan and Afghanistan in the west (Seong S, Choi M & Kim I (2001). Most common presentation was fever and rash was noted in 3.3% cases. No eschar and no mortality were reported (Joshua Mott et al 2002). Scrub typhus infections have reported from neighbouring states like Tamilnadu, Kerala, Karnataka and Orissa. The climatic conditions in Andhra Pradesh are more or less similar to these states therefore it is highly likely that the various infections prevalent may be similar.

Scrub typhus is also known as tsutsugamushi disease. The name tsutsugamushi is derived from two Japanese words: tsutsuga, meaning something small and dangerous, and mushi, meaning creature. (Jeong, YeonJoo, et al. 2007). The infection is called scrub typhus because it generally occurs after exposure to areas with secondary (scrub) vegetation (Anupam Prakash et al., 2014). Therefore, it has been suggested that the names mite borne typhus, or chigger-borne typhus, are more appropriate (Traub, Robert, and Charles L. Wisseman. 1974). Since the disease is limited to eastern and southeastern Asia, India, northern Australia and the adjacent islands, it is also commonly referred to as tropical typhus (Pui-Jen Tsai-2013). Symptoms include fever, headache, muscle

pain, cough, and gastrointestinal symptoms. More virulent strains of *O. tsutsugamushi* can cause hemorrhaging and intravascular coagulation. Maculopapular rash, eschar, splenomegaly and lymphadenopathies are typical signs. Leukopenia and abnormal liver function tests are commonly seen in the early phase of the illness. Pneumonitis, encephalitis, and myocarditis occur in the late phase of illness. Acute scrub typhus appears to improve viral loads in patients with HIV (Watt G, Kantipong P, de Souza M et al. 2000). Control of scrub typhus can be considered in three phases: prevention, prophylactic treatment, and curative treatment once the disease is present (Mahajan, S. K 2005). Prevention works best when threat is perceived as real. The presence of potentially infected chiggers can easily be determined by placing a small piece of black cardboard edge wise on the ground (Devine, Jonathan, 2003). The chiggers will climb to the top of the card and congregate there. Tiny yellow or pink dots moving across the card will confirm the presence of the chiggers (Jonathan Devine 2013). The disease is best prevented by the use of personal protective measures including repellents, people entering an exposed area wear closed in footwear such as boots with socks, and long trousers (Mahajan, Sanjay K. 2012). Exposed areas of skin and clothing itself should be treated with mite repellents. Repellents containing dusting sulphur, dimethyl phthalate or benzyl benzoate has been suggested as suitable agents. Those people working in infected areas should consider impregnating clothing with permethrin. When sitting around or camping, groundcovers and tents with closed floors should be used. Lathering with soap in a hot bath or shower will remove both attached and unattached chiggers. Control of the rodent and marsupial reservoirs may also assist to prevent chiggers coming into areas where

humans are living and working. Simple options such as sealing food containers and burying waste will help with this. Though scrub typhus has been reported from several parts of our country but there are no reports from Andhra Pradesh. Therefore this study was carried out to study the seroprevalence of scrub typhus in this part of Andhra Pradesh.

Materials and Methods

This prospective study was conducted over a period of six months. During this period consecutive non repetitive 150 serum samples received from clinically suspected patients were tested for the presence of scrub typhus by SD Bioline Tsutsugamushi, One step scrub typhus antibody test.

Principle: The tsutsugamushi test has two pre-coated lines. "T" (O.tsutsugamushi antibody test line) and "C" (Control line) on the surface of the strip. These lines in result window are not visible before applying any samples. The "control line" is used for procedural control. Control line should always appear if the test procedure is performed properly and the test reagents of control line are working. A purple "T" line will be visible in the result window if there are enough IgG Antibodies to O.tsutsugamushi in the sample. If IgG, IgM, or IgA antibodies to O.tsutsugamushi are not present in the sample, there is no color appears in "T".

Procedure of the test: The kit components and specimens were allowed to come to room temperature prior to testing. The test device was removed from the foil pouch and placed it on flat, dry surface. Slowly 10micro liter of serum was added to the sample well and 3-4 drops of the assay diluents was added. When the test begins to work, purple colour move across the result

window in the centre of the test device. Test results were interpreted at 10-15min, 20 min and again at 30 min.

Results and Discussion

Interpretation of the test: A color band in the left section of the result window shows that the test is working properly. This band is the control band. The right section of the result window indicates the test results. If another color band appears in the right section of the result window. This band is the test band. The presence of only one band ("C") within the result window indicates a negative result. The presence of two color bands ("T" and "C") within the test result window, no matter which band appears first indicates a positive result. If the purple colour band is not visible or only test line ("T") is visible within the result window after performing the test, the result is considered invalid. The directions may not have been followed correctly or the test may have deteriorated. It is recommended that the specimen be re-tested.

Results: During the study period extending from 15/10/2011 to 15/04/2012 serum samples (150) were received from different clinical departments at Sri Venkateswara Institute of Medical Sciences, Tirupati, AP. Among these scrub typhus test by Rapid test was positive in 58(38.6%) samples. Among scrub typhus positive samples 24% were from males and 14.6% from females. Among the 150 samples processed, maximum number of samples was from patients between age group 16 -30 years (34.6%) and minimum number of samples from patients less than 15 years of age (1.3%) Majority of samples were from males 67.3%. Positivity among males (24%) was 1.64 times higher than positivity among females (14.6%). Positivity was highest in 31 -45(30.4%) age group among males.

positivity was low in age groups 61 -80 (13.4%). The low positivity among females and extreme as groups may be due to limited exposure to outdoor environment as compared to males in productive years of life. (Fig 1)

Most common presentation in our study which is similar to a hospital based study. Samples received from males were twice (67.3%) in number as compared to sample from females (32.6%). Maximum number of samples received were from patients between age group 16-30 y (52 patients) and minimum number of samples were from patients less than 15 y of ages (2 patients). No samples were received from females less than 15 years of age.(Table-1)

Scrub typhus antibodies were detected in 58(38.6%) patients with highest positivity among patients of more than 30y of age with male predominance (30.4%). Lower positivity among males was observed between age group 61-80(25%). In females highest positivity was observed between age group 31-60(32%).

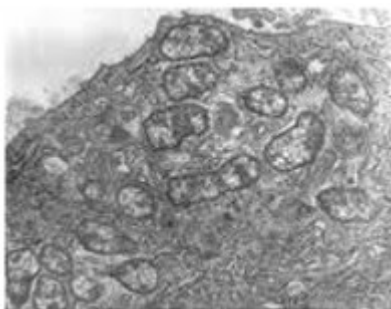
Most common presentation was fever with chills and rigor (100%) with other complaints like vomiting in 50%, headache in 30%, and cough in 16.7% and other in decreasing order. No mortality was observed. (Table-2)

Discussion: This the first study on the seroprevalance of Scrub typhus from Andhra Pradesh. Previously there are no

reports of rickettsial infections from this state and it is believed that these infections do not exist here. Our study findings are contrary to the belief. Therefore it is recommended that larger sample based studies may be taken up in which may throw better light on the seroprevalence and clinical presentations of Scrub typhus. This prospective study was conducted over a period of six months from October 2010 to April 2012. During this period a total of 150 serum samples received from various clinical departments were tested for scrub typhus. Total sero-prevalence of scrub typhus among patients was found to be 38.7%. Sero-prevalence was found to be highest in the age group of 31-45 y [30.4%] with male predominance followed by females in the age group 31-45 y [17.3%]. The climatic conditions in Andhra Pradesh are more or less similar to these states therefore it is highly likely that the various infections prevalent may be similar.

Our study provides an evidence for the seropositivity of Scrub typhus in this state. It is recommended that Scrub typhus should be included in the differential diagnosis of fever of unknown origin and proper diagnostic workup should be done to arrive at the proper diagnosis, so that timely and adequate treatment may be given to patient as delay in treatment is associated with high mortality. Thus, knowledge of geographic distribution and effect of season of the disease shall help health care providers to recognize and control disease in better way.

Figure.2 O tsutsugamushi



Tsutsugamushi, an obligate intracellular gram-negative bacterium

Table.1 showing scrub typhus positivity in relation to age and sex

Age	SCRUB TYPHUS POSTIVE		TOTAL
	MALE NO. (%)	FEMALE NO. (%)	
0-15	1(50%)	-	2
16-30	7(13.4%)	6(11.5%)	52
31-45	14(30.4%)	8(17.3%)	46
46-60	10(29.4%)	5(14.7%)	34
61-80	4(25%)	3(18.7%)	16
TOTAL	36(24.1)	22(14.6%)	150

Table.2 showing common symptoms and their percentages

Clinical Features	No. of Patients	Percentage
Fever	58	100%
Rigor	58	100%
Vomitings	29	50%
Cough	9	16.7%
Chills	58	100%
Headache	17	30%
Skin rash	2	3.3%
Pain abdomen	6	10%
Seizures	2	3.3%
Bodypain	8	13.3%
Oliguria	4	6.7%

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