



Scrub Typhus: Jammu Outbreak-2009

Annal Mahajan, D.S Jasrotia, R.S. Charak*, Tejinder Kumar, P.L. Bhagat, Neeraj Sharma, BB Gupta

Abstract

This is a first report of 20 adult cases describing clinical feature, epidemiological profile and treatment outcome of clinically diagnosed scrub typhus confirmed by test for antibodies (IgM) to *O. tsutsugamushi* using ELISA kit. Majority of the cases belonged to the district Rajouri (45%) from hilly & rural belts. Outbreak was Autumn Winter type as all cases reported in month of September and October. The common clinical features were fever 100%, myalgia 50%, headache 30%, conjunctival congestion 30%, eschar 35%, rash 25%, lymphadenopathy 45%, splenomegaly 40%, hepatomegaly 40%, edema 25%, ARDS 35%, altered sensorium 10%, hypotension 20% & metrorrhagia in 5% of patients. Use of Immunological test helped to establish diagnosis of scrub typhus. Thus all the cases were managed successfully without any mortality with doxycycline and or azithromycin & one with addition of rifampicin.

Key Words

Rickettsial, Scrub Typhus, *Orientia Tsutsugamushi*

Introduction

Scrub typhus is widely endemic in a geographically confined area of the Asia-Pacific region, the so-called tsutsugamushi-triangle, as well as tropical and subtropical regions of the Asian continent including India (1-3). Worldwide more than one million cases occur annually and as many as one billion people living in endemic areas may have been infected at some time (4). Many studies from India particularly from South India (5, 6, 7), Haryana (8), Himachal Pradesh (9-11), Mumbai (12) Karnataka (13) and Jammu (14-18) have reported outbreak/ isolated reports of scrub typhus in the past. Although, a seasonal outbreak of cases of fever is being reported continuously for the last 7 to 8 years from various regions of Jammu but the disease remained undiagnosed or under-diagnosed.

This is a first report of 20 adult cases describing clinical feature epidemiological profile and treatment outcome of clinically diagnosed & tested for antibodies (IgM) to *O. tsutsugamushi* using ELISA kit, from Jammu region from period Sept 09 to Oct 09.

Material and Methods

Keeping high level of suspicion all cases of fever admitted in the ward during Sept to Oct 2009 formed the study group. A thorough clinical examination and all relevant investigation were carried as the case demanded for diagnosis. However, the serological samples among these patients admitted in a particular medical unit of the Department of Medicine, GMC, Jammu, suggestive of even one or two clinical features (fever or rash) of scrub typhus (n=27), were sent to National Institute of Communicable Diseases, Delhi to be tested for antibodies (IgM) to *O. tsutsugamushi* using ELISA kit (19).

Results

Presence of IgM antibodies against *Orientia tsutsugamushi* was demonstrated in 20 cases which indicate recent infection of scrub typhus, out of 27 samples with 74.04% positivity rate. Majority of the cases belonged to the district Rajouri (45%). All the cases were from the rural belts. 18 patients were involved in some sort of farm work at the time of infection. 70% reported in month of September and 30% in October. (85%) were females and only 3 (15%) were males. Most of the cases belonged to the age-group of 26- 50 years (65%). (Table-1). The clinical features of the patients, lab investigations, complications, and treatment outcome are shown in table 2- 9 and fig-1.

Discussion

Scrub typhus or tsutsugamushi disease is widely endemic in Indian subcontinent. Many studies from India (5-17) have reported outbreak/ isolated reports of scrub typhus in the past. In 1978, first time, Jammu was recognised as a scrub typhus prone region, in a survey conducted by Menon *et al* (14) wherein, 3.5% of the total populations examined (n=1017) possessed antibodies to the test antigen of scrub typhus. Few isolated case reports (15) and an outbreak of scrub typhus (17) has been reported in past from Jammu region. Recently also an outbreak of 21 cases of children (5-18yrs) from period between October 08 to September 09 has been reported (18). Three reports of scrub typhus exist from Jammu Region till date. Some cases of fever for last 7-8 years remained undiagnosed or under-diagnosed for scrub typhus due to its difficulty in diagnoses, because of its nonspecific clinical presentation, low index of suspicion and absence of advanced laboratory diagnostic techniques in our setup.

From the PG Department of G. Medicine, Government Medical College, Jammu & *DHS-Jammu (J&K)- India.

Correspondence to : Dr. Annal Mahajan, Associate Professor, PG Department of G Medicine, GMC, Jammu J&K-India



Table-1. Epidemiological Profile

Total No. of Samples tested	27
Total No. of Samples tested Positive	20
Positivity Rate	74.07%
Time/Season	
September-09	14 (70%)
October -09	6 (30%)
Age (in years)	
0- 25	6(30%)
26-50	13(65%)
51-75	1(5%)
Sex distribution as per age (yrs)	(M:F)
0- 25	0:6
26-50	3:10
51-75	0:1
Area Distribution	
Rajouri	9(45%)
District Jammu	4(20%)
Udhampur	4(20%)
Kathua	2(10%)
Samba	1(5%)
Rural Vs Urban (n)	20: 0
Occupation	
Farmer	18 (90%)
Student	1(5%)
Policeman	1(5%)

Table 2. Showing Clinical Feature

Clinical Feature	No. of cases	Percentage
Clinical Symptom		
Fever	20	100
Myalgias	10	50
Headache	6	30
Breathlessness	7	35
Conjunctival	6	30
Congestion		
Cough	8	40
Joint Pain	0	0
Vomiting	4	20
Pain Abdomen	4	20
Altered Sensorial	2	10
Diarrhea	2	10
Clinical Sign		
Lymphadenopathy	9	45
Splenomegaly	8	40
Eschar	7	35
Rash	5	25
Hypotension	4	20
Hepatomegaly	8	40
Raised JVP	3	15
Metrorrhagia	1	5
Edema	5	25
Unusual Presentation	0	0

Fig 1. Showing Eschar on the Abdominal Wall



Table3. Showing Characteristics of Eschar (n=7)

Age & Sex	No.	Site	Main Clinical Feature	Complication	T/t outcome
28 F	1	Supraumbilical	Fever, Diarrhea, Myalgias	Hypotension	Successful
22 F	1	Supraumbilical	Fever, Rash, Edema, Lymphadenopathy, Hepatosplenomegaly	CCF	Successful
45F	1	Infraumbilical	Fever, Headache, Cough	Hypotension	Successful
30F	1		Fever, Edema, Vomiting	CCF	Successful
30F	1	Left leg	Lymphadenopathy, Hepatosplenomegaly	Hypotension	Successful
20F	1	Neck	Fever, Vomiting, rash Pain abdomen, Conjunctival Congestion	-	Successful
27M	1	Infraumbilical	Fever, Myalgia, Cough	-	Successful

Table 4. Duration of Fever at the Time of Hospitalization

Duration of fever (in days)	No. of cases	Percentage
0-7	8	40
8-14	10	50
>14	2	10

Table 5. Lab Investigations Table

Lab features	No. of cases	Percentage
Raised ALT	6	30
Raised AST	6	30
Leucocytosis	6	30
Activated lymphocytes	4	20
Proteinuria	5	25
Haematuria	2	10

Table 6. Showing Complications

Complications	No. of cases	Percentage
Hepatic Dysfunction	6	30
ARDS	7	35
Hypotension	5	25
CHF	3	15
Neurological Complication		
Meningitis (Lymphocytic predominant CSF Pleocytosis)	4	20
ARF	0	0
Hematuria & Proteinuria	6	30
Abdominal-pelvic Manifestation	0	0
Hematological	0	0
Vasculitis	0	0
ICU Requirement	1	5
Successful Treatment outcome	20	100
Mortality	0	0

Table 7. Showing Defervescence of Fever after Treatment

Time to Defervescence (in days)	No. of cases	Percentage
0-2	10	50
3-5	7	35
>5	3	15

Table 8. Showing Treatment Outcome

Treatment/Drugs	No. of cases managed	Positive Outcome
Cefipime + Doxycycline	6	100%
Cefipime+ Azithromycine	2	100%
Choramphenicol (Pregnant Patient)	1	100%
Ceftrioxone + Doxycycline	8	100%
Ceftrioxone + Doxycycline+Azithromycine	2	100%
Cefepime+Doxycycline+Azithromycine+Rifampicin	1	100%
Empirical Treatment	20	100%

**Table 9. Profile of Pregnant Scrub Typhus Patient**

Age & Sex	Gravida/Parity & Gestational Age	Main Clinical Feature	Maternal/Foetal Outcome	T/t outcome
20 F	G1P0 & 21 wks	Fever, Vomiting, Hypotension, Eschar, ECG-Sinus Tachycardia	Complete Maternal Recovery, Foetal Outcome Not Known	I/V Chloramphenicol Successful

Table 10. Effect of Season

Author	Region	Season
Current Study	Jammu	September & October (09)
Vaz <i>et al</i> (17)	Jammu	July to October (02)
Dingra <i>et al</i> (18)	Jammu	September & October (08 to 09)
Jasrota <i>et al</i> (16)	Jammu	Ending August (04)
Singh P (15)	Jammu	September (01)
Mathai <i>et al</i> (5)	Tamil Nadu	October to February (01-02)
Vivekanandan <i>et al</i> (7)	Pondicherry	April & September (06 to 08)
Liu <i>et al</i> (20)	Northern China	September & December (1995 to 02)

In the current study most of these patients were from Sunderbani-Naushera-Rajouri (45%), 20% from udhampur belt which forms a hilly terrain, however 20%, 10% & 5% were from Jammu, Kathua & Samba region which forms plain areas. The similar results were reported by a study by Digra *et al* (18), who reported 52.35% from same region of Sunderbani-Naushera-Rajouri. Epidemiological reports (2-4) confirms strong existence of scrub in hilly/ rain prone areas. Thus, history of local travel also become very important beside history of travel outside the state in scrub typhus prone regions of India.

Recent outbreaks of 20 patients from Jammu, have been reported in a period from September 09 to October 09 resembling as autumn- Winter type which occurs exclusively from September to December with a peak occurrence in October (Table 10). In comparison with the summer type, complications associated with autumn-winter type scrub typhus are less severe and abnormalities of routine hematological parameters are less obvious as suggested by Liu *et al* (20). This probably must be the one of the reason for 0% mortality in the current outbreak. 90% of our cases were engaged in farm work at the time of infection, suggesting the influence of these activities on transmission of infection from mite. Farm work and related activities were noted in 64% of the cases by Ogawa *et al* (4) and in 68% of the cases by Liu *et al* (20).

Age and sex are known to influence the occurrence of scrub typhus mainly due to the exposure and inclination of outdoor activities whether occupational or recreational. Most of the cases belonged to the age-group of 26- 50 years. 85% of the patients were women and this may be due to equal or even more vigorous involvement of rural women in the farm work. Ogawa *et al* (4) did not note any sex influence on the distribution of cases. Epidemiological studies are required for further elaboration of this point. The clinical course of the disease and the prognosis vary depending on the character of the endemic strain. These variations in clinical presentations & severity are very much

Table 11. Clinical Profile of Scrub Typhus

Authors Current Study	Place	No.Cases	Clinical Feature
Current Study	Jammu	20	Fever 100%, Myalgia 90%, Conjunctival Congestion 35%, Eschar 35%, Rash 40%, Lymphadenopathy 45%, Splenomegaly 40%, Hepatomegaly 15%, edema 15%, altered sensorium 20%
Vaz <i>et al</i> (17)	Jammu	12	Fever, malaise and body ache 100% each. Conjunctival congestion in 5 & 2 had rashes which was sparse and located on the abdomen. One patient had an infected eschar. Lymphadenopathy was seen in three while one patient had hepatosplenomegaly
Mahajan <i>et al</i> (9)	HP	21	Fever (100%). Chills & rigors (72%), vomiting (43%), headache & myalgias (38%), lymphadenopathy (53%), jaundice (53%), congested eyes (34%), hepato-splenomegaly (43%), pain abdomen (29%), altered sensorium (24%), seizures (19%), rash (10%) & eschar (10%).
Mathai <i>et al</i> (5)	Tamil Nadu	27	Fever > 1 wk 100%. Myalgias (52%), Cough (44%), Jaundice 26%, altered sensorium (19%), rash (22%) & Eschar 4%.
Vivekanandan <i>et al</i> (7)	Pondicherry	50	Fever 100%, myalgia 38%, Cough 40%, Vomiting 58%, Lymphadenopathy 30%, Hepatomegaly 28%, Jaundice 10%, Eschar 46%
Berman <i>et al</i> (21)	South Vietnam	87	Fever 100%, Myalgia 32%, Cough 45%, Nausea & Vomiting 28%, Lymphadenopathy 85%, Hepatomegaly 43%, Rash 43%, Eschar 46%
Ogawa <i>et al</i> (4)	Japan	462	Fever, rash & eschar in 98%, 93%, and 97%. Elevated levels of CRP, AST & ALT in 96, 87, 77% patients, respectively

evident in the studies from different parts and at different times from world as well as India including Jammu (Table-11). The fever is the common symptoms and is present in almost all the patients of scrub typhus as evident from reviewing the literature (Table-11). The presence of an eschar is though, highly suggestive of scrub typhus but is reported (Table-11) to occur in a variable proportion of patients in various studies. Thus, its presence confirm and is pathognomic of the disease but its absence does not exclude the possibility of scrub typhus. In our study, rash and eschar each were seen in 35% of the cases. Indian studies by Mathai *et al* (5), Vivekanandan *et al* (7) & Mahajan *et al* (9) reported an incidence of eschar as 4%; 46% and in 10% of cases respectively. Berman *et al* (21) reported rash in 34% of cases while Vivekanandan *et al* (7) reported it in 14% of the cases. One interesting observation can be made from studies from Taiwan, Japan & China which recorded very high % of patients with eschar as 69%, 97% & 84% respectively (22-24). Lymphadenopathy was found in 45% of the cases in our cases and this is consistent with observations in other studies. In a study from china (20), lymphadenopathy was detected in 52% of the patients. In India, Mahajan *et al* (9) found it in 53% of the cases while Vivekanandan *et al* (7) in 30% of the cases. 35% of our patients had features of



acute respiratory distress disorder which is quite high as compared with other data; 8% as reported by Vivekanandan *et al* (7). Neurological dysfunction was present in 20% of the cases, with feature of lymphocytic exudative cerebrospinal fluid in one case and focal neurological deficit in one case. Three patients had atypical lymphocytes in the blood and their importance stems from the fact that in one scoring system for the diagnosis of scrub typhus they have given it a prime importance (25). Elevated levels of AST and ALT were found in approximately 30% of the patients. In addition, proteinuria and hematuria & ARDS were found in 25, 10 & 35 % of the patients, ARDS in 35% suggesting that they are not rare symptoms (20). The comparison with various studies has been made in *table-11*.

The important points about recent outbreaks is that instead of Weil-Felix test, this time most sensitive and the one which is considered gold standard ie. tested for antibodies using ELISA kit, which probably has resulted in high pick up of scrub typhus in recent outbreaks in comparison to previous outbreak reported by Vaz *et al* (17). 41 cases picked up in recent outbreaks from adult & pediatric population in comparison to 12 cases only in outbreak reported by Vaz *et al* (17). Moreover, it has helped to establish diagnosis early and thus all the cases were managed successfully without any mortality or any complication. Response to correct drug therapy is very rapid in the cases of scrub typhus. Doxycycline remains the drug of choice. In all the patients, doxycycline was given empirically as there was a delay of about 5 to 7 days before the reports of the samples arrived. The implication/consequences of starting empirical therapy can be serious in form of emergence of resistant strains, which may pose threat in future treatment plans for scrub typhus. In view of failure of above regimen in some cases of azithromycin was used in serious cases. One female continued to deteriorate despite these drugs and rifampicin was added and patient became a febrile on 2nd day of therapy raises the possibility of drug resistance.

Conclusion

Reemergence of scrub typhus in this region confirms Jammu as scrub typhus prone region and demands, a high degree of clinical suspicion and familiarity with the various clinical manifestations, availability and use of rapid immunological test in suspected case to allow early diagnosis and timely initiation of appropriate therapy and thereby reducing patient morbidity and mortality.

References

1. Tamura A, Ohashi N, Urakami H, Miyamura S. Classification of Rickettsia tsutsugamushi in a new genus, Orientia gen nov, as Orientia tsutsugamushi comb. *Int J Syst Bacteriol* 1995; 45: 589-91.
2. Lai CH, Huang CK, Chen YH, *et al*. Epidemiology of acute q Fever, scrub typhus, and murine typhus, and identification of their clinical characteristics compared to patients with acute febrile illness in southern taiwan. *J Formos Med Assoc* 2009 ;108(5):367-76.
3. Suputtamongkol Y, Suttinont C, Niwatayakul K, *et al*. Epidemiology and clinical aspects of rickettsioses in Thailand. *Ann N Y Acad Sci* 2009; 1166:172-79.
4. Ogawa M, Hagiwara T, Kishimoto T, *et al*. Scrub Typhus In Japan: Epidemiology And Clinical Features of Cases Reported In 1998. *Am J Trop Med Hyg* 2002; 67(2):162-65
5. Mathai E, Rolain JM, Verghese GM, *et al*. Outbreak of scrub typhus in southern India during the cooler months. *Ann N Y Acad Sci* 2003; 990:359-64.
6. Pavithran S, Mathai E, Moses PD. Scrub typhus. *Indian Pediatr* 2004;41(12):1254-47.
7. Vivekanandan M, Mani A, Priya YS, Singh AP, Jayakumar S, Purty S. Outbreak of scrub typhus in Pondicherry. *J Assoc Physicians India* 2010; 58(1):24-28
8. Chaudhry D, Garg A, Singh I, Tandon C, Saini R. Rickettsial diseases in Haryana: not an uncommon entity. *J Assoc Physicians India* 2009; 57:334-37.
9. Mahajan SK, Kashyap R, Kanga A *et al*. Relevance of Weil-Felix Test in Diagnosis of ScrubTyphus in India. *J Assoc Physicians India* 2006; 54(8):619-21.
10. Mahajan SK, Bakshi D. Acute Reversible Hearing Loss in Scrub Typhus. *J Assoc Physicians India* 2007; 55(7): 512-14
11. Mahajan SK, Rolain JM, Sankhyan N, Kaushal RK, Raoult D. Pediatric scrub typhus in Indian Himalayas. *Indian J Pediatr* 2008 Sep 22. [Epub ahead of print]
12. Shah V, Vaidya V, Bang V, Shah I. Spotted fever in a child in Mumbai. *India. J Vector Borne Dis* 2009c;46(4):310-12.
13. Patil D, Bidari LH, Tikare N, Revankar VA. Profile of TRickettsial Fever in Children. Paper Presented at : Pedicon.2005, Available at :http://www.pediatriconcall.com/for-doctor/conference_abstracts/karnataka_pedicon/profile_rickettsial_fever_in_children.asp. (Cited on march, 2010)
14. Menon RD, Padbidri VS, Gupta NP. Sero-epidemiological survey of scrub typhus. *J Hyg Epidemiol Microbiol Immunol* 1978;22(3):306-11.
15. Singh P. Scrub Typhus, a Case Report : Military and Regional Significance. *MJAFI* 2004; 60 : 89-90
16. Jasrotia DS, Lal M. Fever - Endemic Typhus in Jammu . *JK Science* 2004; 6(2):56-57
17. Vaz LS, Gupta NK. Outbreak of Scrub Typhus in Jammu - A Report. *MJAFI* 2006; 62 : 342-343
18. Dingra SK, Saini GS, Singh V, Sharma SD, Kaul R. Scrub Typhus in Children: Jammu Experience. *JK Science* 2010; 12(2):95-97
19. Crum JW, Hanchalay S, Eamsila C. New paper enzymelinked immunosorbent technique compared with microimmunofluorescence for detection of human serum antibodies to Rickettsia tsutsugamushi. *J Clin Microbiol* 1980; 11:584-88.
20. Liu YX, Feng D, Suo JJ *et al*. Clinical characteristics of the autumn-winter type scrub typhus cases in south of Shandong province, northern China. *BMC Infect Dis* 2009 4; 9:82
21. Berman SJ, Kundin WD. Scrub typhus in South Vietnam. A study of 87 cases. *Ann Intern Med* 1973; 79(1):26-30.
22. Huang CT, Chi H, Lee HC, Chiu NC, Huang FY. Scrub typhus in children in a teaching hospital in eastern Taiwan, 2000-2005. *Southeast Asian J Trop Med Public Health*. 2009;40(4):789-94.
23. Jim WT, Chiu NC, Chan WT, *et al*. Clinical manifestations, laboratory findings and complications of pediatric scrub typhus in eastern Taiwan. *Pediatr Neonatol* 2009; 50(3): 96-101.
24. Liu YX, Jia N, Suo JJ, Xing YB. Characteristics of pediatric scrub typhus in a new endemic region of northern China. *Pediatr Infect Dis J* 2009 ; 28(12):1111-14.
25. Chen NY, Huang PY, Leu HS, *et al*. Clinical prediction of endemic rickettsioses in northern Taiwan--relevance of peripheral blood atypical lymphocytes. *J Microbiol Immunol Infect* 2008 ;41(5):362-68.