

Pattern of admission and clinical outcome of scrub typhus patients admitted in PICU in Southern Rajasthan

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Abstract

Introduction: Scrub typhus is a potentially fatal disease in pediatric age group. Caused by *Orientia tsutsugamushi*, it is a major cause of acute febrile illness in children in the rural tropical area of south East Asia.

Methods: Information retrieved included age, sex, period of stay in ICU, clinical features, laboratory test results, complications observed and morbidity and mortality profile of patients admitted in PICU in the last five years.

Results: In last five years, a total of 147 patients who were diagnosed as cases of scrub typhus were admitted into PICU. There were 39 (26.5%) male and 108 (73.4%) female patients giving an F: M ratio of 2.76:1. (4) 2.7% were of 1 month to 3 years of age, and (29) 19.7% were patients aged 3-10 years, and (114) 77.5% were of 10 years to 18 years of age. The most common presenting complaint at the time of admission was high grade fever (100.0%). The overall mortality rate among scrub typhus patients was 12.9%.

Conclusion: In our PICU, mortality rate of scrub typhus patients is high (12.9%). The presentation of scrub typhus is often variable, usually non-specific, however with doubtless severe multi-organ pathology. Eschar was noted in significantly less no. of patients in our PICU as compared to other similar studies. Early detection is essential for specific treatment and better outcomes. Further study of strains of scrub typhus should be done to create a vaccine for this disease and sensitive and accurate testing.

Keywords: Eschar; clinical features; multi-organ pathology; Early detection.

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Introduction

Scrub typhus is an acute febrile illness characterized by atypical eschar,

generalized lymphadenopathy, skin rashes, and vague non-specific symptoms such as

myalgia, headache, and cough[1]. It is characterized by focal or disseminated vasculitis and perivasculitis, which may involve the lung, heart, liver, spleen, and central nervous system[1,2]. Scrub typhus is common throughout in rural and in suburban areas in Korea, and is one of the most frequently reported infectious diseases during the months of October and November[3,4]. The first patient with scrub typhus in Korea was reported in 1951[5]. However, ever since the second case of scrub typhus was reported in 1986, the annual incidence of the disease has increased steadily and its reported incidence sharply rose to 6,480 cases in 2006[6,7].

India is an integral component of “tsutsugamushi triangle” which depicts a part of the globe endemic to scrub typhus. The “tsutsugamushi triangle” extends from northern Japan and far-eastern Russia in the north, to northern Australia in the south, and to Pakistan in the west[8]. Scrub typhus is one of the important causes of acute undifferentiated febrile illnesses in Asia[9]. High index of suspicion and careful examination for eschar at the bite site is vital for the clinical diagnosis. States like Assam and West Bengal reported the first scrub typhus epidemics in India during World War II. Later scrub typhus was reported in humans and experimental animals exposed in these areas[10]. Owing to frequent outbreaks witnessed in different parts of the country in the recent past, scrub typhus is described as a re-emerging infectious disease in India[9,11-14].

Laboratory confirmation of scrub typhus is generally by serological methods, with the indirect fluorescent assay being the most commonly used test; paired titres are usually required to make a confirmatory diagnosis[15]. ELISA and passive haemagglutination assay are also available. The Weil-Felix test is now considered less useful, as it has low sensitivity and

specificity. Culture of the organism and PCR are only available in few specialised centres. The pathophysiology of scrub typhus is not fully understood, though in general it is thought to be due to focal or disseminated vasculitis. The principal target site of the organism is the vascular endothelium.¹⁶ Like many other tropical diseases, a wide range of clinical manifestations have been reported with scrub typhus.

In this study we will study the age and sex distribution, clinical features, complications observed and outcome among patients admitted in our PICU of a rural tertiary health care centre which are diagnosed as confirmed cases of scrub typhus during the period of 5 years (from January 2016 to December 2020)

Material and Methods:

Present Study is a retrospective study of the pattern of admissions of scrub typhus diagnosed cases into the PICU of a tertiary care centre in south Rajasthan in India from January 2016 to December 2020. The hospital of study is a tertiary care centre with medical college attached with a ten-bedded modern and well-equipped PICU, in which patients from 1 month to 18 years of age are admitted. A formatted research protocol was designed and submitted to institutional ethical clearance committee prior to initiation of study. Ethical approval was obtained prior to starting data collection. A written informed consent was taken from the parents of admitted cases for their inclusion in the study.

PICU records of all patients of scrub typhus as a confirmed diagnosis, their laboratory records and their outcomes were used for this study. Data taken from the records included age, sex, period of stay in ICU, clinical features, laboratory test results, complications observed and outcome of all the scrub typhus patients admitted to our PICU. The outcome is

classified as discharges, patients who left against medical advise (LAMA), and deaths. The data obtained were entered into the Statistical Package for Scientific Solutions (SPSS) version 16.0 spreadsheet and analyzed. Means, standard deviations, percentages, and ranges were used as appropriate to describe continuous variables.

Inclusion Criteria:

All Paediatric patients admitted to our PICU who were diagnosed as a confirmed case of scrub typhus in age group of one month to 18years of age.

Exclusion Criteria:

- 1) All suspected cases of scrub typhus who did not undergo rapid antigen testing for confirmation of scrub typhus.
- 2) All suspected/confirmed cases of below 1 month or above 18 years of age.

Results:

In last five years, a total of 147 patients who were diagnosed as cases of scrub typhus were admitted into PICU. There were 39 (26.5%) male and 108 (73.4%) female patients giving an F: M ratio of 2.76:1 (Table1). 04 subjects (2.7%) were of 1 month to 3 years of age, and 29 (19.7%) were patients aged 3-10 years, and 114 (77.5%) were of 10 years to 18 years of age (Table 1).

The most common presenting complaint at the time of admission was high grade fever which was seen in all 147 (100.0%) cases, followed by difficulty in breathing seen in 77 (52.3%), myalgia in 43 (29.2%), skin rash among 16 (10.8%), neck stiffness in 11 (7.4%), eschar in 1 (0.6%), nausea & vomiting 62 (42.2%), pain abdomen 33 (22.4%), seizures 13(9.0%) (Table 1).

High grade fever was the most common manifestation in children of all age groups in the presently study pool.

Table 1: Clinico-Demographic Profile

Clinical Manifestations	N	%	Demographic Data	N	%
Fever	147	100%	Age		
Difficulty In Breathing	77	52%	<i>1-12 Months</i>	04	2.7%
Myalgia	43	29.2%	<i>1-10years</i>	29	19.7%
Skin Rash	16	10.8%	<i>10-18years</i>	114	77.5%
Neck Stiffness	11	7.4%	Sex		
Eschar	01	0.6%	<i>Male</i>	39	26.5%
Nausea & Vomiting	62	42.2%	<i>Female</i>	108	73.4%
Pain Abdomen	33	22.4%			
Seizures	13	9%			

Laboratory picture of patients of scrub typhus showed significant correlation with malarial infection. A total of 93 (63.2%) among total number of 147 scrub typhus diagnosed cases were also found out to be infected by malaria detected through use of malarial parasite rapid card test and PBF examination.

Deranged liver function tests were also noted in 102 (69.3%) out of total 147 cases. In CBC profile, significantly decreased platelet count was noted in 79 (53.7%) of the cases, hyponatremia seen in 38 (25.9%) cases, and increased level of serum creatinine seen in 24 (16.2%) cases.

Table 2: Laboratory picture of scrub typhus positive patients

Laboratory Findings	N	%
Elevated Liver Enzymes	102	69.3%
Low Platelet Count	79	53.7%
MPDA +ve*	93	63.2%
Hyponatremia	38	25.9%
Elevated Creatinine	24	16.2%

(* - Malarial Parasite Dual Antigen test)

Most common complication observed in patients of scrub typhus was pleural effusion in 123 (83.6%) subjects followed by Hepatitis in 119 (82.3%) subjects,

splenomegaly in 110 (74.8%) subjects, while meningitis and lymphadenopathy were seen in 13 (8.8%) and 4 (2.72%) subjects respectively. (Table 3)

Table 3: Most Common Complication Observed in Patients of Scrub Typhus

Complication	N	%
Pleural Effusion	123	83.6%
Hepatitis	119	82.3%
Splenomegaly	110	74.8%
Meningitis	13	8.8%
Lymphadenopathy	04	2.72%

A total of 22 (14.9%) patients needed ventilator support during their course of treatment out of which, 97 (65.9%) patients improved and were transferred to

the pediatric wards for further management and later discharged, while 31 (21.0%) subjects left against medical advice. (Table 4)

Table 4: Clinical Outcome of Scrub Typhus Positive Patients

Clinical Outcome	N	%
Ventilatory Support	22	14.9%
Discharged	97	65.9%
Lama	31	21.0%
Death	22	14.9%

Among the entire subject pool under study, 22 (14.9%) patients died due to complications of scrub typhus infection,

consisting of 12 (63.1%) females and (36.8%) 7 males

Table 5: Sex Distribution Among Death

Sex	N	%
Female	12	63.1%
Male	07	36.8%

The overall mortality rate among the selected study population was 12.9%. Scrub typhus showed significant seasonal

variation, A higher proportion of cases were noted in post-monsoon period (August to December) which were 139 (94.5%) out of total cases. (Table 6)

Table 6: Seasonal Variation of Admitted Scrub Typhus Patients

Seasonal Variation	N	%
Post Monsoon (Aug – Dec)	139	94.5%
Pre Monsoon (Jan- July)	008	5.5%

Discussion:

Scrub typhus is a potentially fatal infection that affects about 10 lakh / year. Mostly presented in the emergency with high grade fever, nausea, vomiting, respiratory distress, myalgia, skin rash, eschar[4].

It is difficult to differentiate scrub typhus from other co-endemic diseases like malaria, dengue. Therefore a big index of clinical suspicion, exploring the history of environmental exposure and vigilant search for the eschar are important for diagnosis. Seasonal occurrence of scrub typhus is seen and it varies with the climate in different countries[7].

Epidemic period is influenced by the activities of the infected mite and often occurs during the rainy season. However, similar to our study, outbreaks have been reported during the cooler season or post monsoon, in India. In the cooler months, there is an increase in secondary shrub vegetation which in turn favors the growth of the vector. In the same season, farmers are involved in harvesting activity in the fields, where they are exposed to the bites of larval mites[9].

Therefore, intensified health education activities are needed in the rainy and post monsoon sessions to cut down the transmission. Targeted preventive interventions like personal protection are to be canvassed among the high-risk groups like farmers and those involved in collecting firewood from jungle. This overall case-fatality in our study of 14.9% is lower than previously reported from other hospitals in 2018/2019[17].

This trend may primarily be due to increased awareness and early recognition and treatment of the cases by physicians.

We recommend routine screening of patients with such clinical features in areas of high endemicity. Also, awareness of the rarer manifestations is also important, and it is hoped that this review will guide clinicians towards suspecting the diagnosis of scrub typhus early when presented with unusual manifestations in the background of an acute febrile illness.

Conclusion:

In the present study among the patients admitted in PICU, mortality rate of scrub typhus patients is high (12.9%). The presentation of scrub typhus is often variable, usually non-specific, however with doubtless severe multi-organ pathology. Eschar was noted in significantly less number of patients in our PICU as compared to other similar studies. Early detection is essential for specific treatment and better outcomes. Further study of strains of scrub typhus should be done to create a vaccine for this disease and sensitive and accurate testing.

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References:

1. Jeong YJ, Kim S, Wook YD, Lee JW, Kim KI, Lee SH. Scrub typhus: clinical, pathologic, and imaging findings. *Radiographics*. 2007 Jan;27(1):161-72.
2. Levine HD. Pathologic Study of Thirty-One Cases of Scrub Typhus Fever with especial reference to the Cardiovascular System. *American heart journal*. 1946;31(3):314-28.
3. Kim YS, Yun HJ, Shim SK, Koo SH, Kim SY, Kim S. A comparative trial of a single dose of azithromycin versus doxycycline for the treatment of mild

- scrub typhus. *Clinical infectious diseases*. 2004 Nov 1;39(9):1329-35.
4. Chang WH. Current status of tsutsugamushi disease in Korea. *J Korean Med Sci*. 1995 Aug 1;10(4):227-38.
 5. Munro-Faure AD, Andrew R, Missen GA, Mackay-Dick J. Scrub typhus in Korea. *Journal of the Royal Army Medical Corps*. 1951;97(4):227-9.
 6. Lee JS. Thirteen cases of rickettsial infection including nine cases of tsutsugamushi disease. First confirmed in Korea. *J Korean Med Assoc*. 1986; 29:430.
 7. Lee CS, Hwang JH, Lee HB, Kwon KS. Risk factors leading to fatal outcome in scrub typhus patients. *The American journal of tropical medicine and hygiene*. 2009 Sep 1;81(3):484-8.
 8. Izzard L, Fuller A, Blacksell SD, Paris DH, Richards AL, Aukkanit N, Nguyen C, Jiang J, Fenwick S, Day NP, Graves S. Isolation of a novel *Orientia* species (*O. chuto* sp. nov.) from a patient infected in Dubai. *Journal of clinical microbiology*. 2010 Dec 1;48(12):4404-9.
 9. Chrispal A, Boorugu H, Gopinath K, Prakash J, Chandy S, Abraham O, et al. Scrub typhus: an unrecognized threat in South India—clinical profile and predictors of mortality. *Trop Doct*. 2010;40(3):129–33.
 10. Padbidri VS, Gupta NP. Rickettsiosis in India. A review. *Journal of the Indian Medical Association*. 1978;71(4):104-7.
 11. Sharma A, Mahajan S, Gupta ML, Kanga A, Sharma V. Investigation of an outbreak of scrub typhus in the Himalayan region of India. *Japanese journal of infectious diseases*. 2005 Aug 1;58(4):208.
 12. 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 journal of medical microbiology*. 2016 Jul 1;34(3):293-8.
 13. Khan SA, Dutta P, Khan AM, Topno R, Borah J, Chowdhury P, Mahanta J. Re-emergence of scrub typhus in northeast India. *International Journal of Infectious Diseases*. 2012 Dec 1;16(12):e889-90.
 14. Varghese G, Abraham O, Mathai D, Thomas K, Aaron R, Kavitha M, et al. Scrub typhus among hospitalised patients with febrile illness in South India: magnitude and clinical predictors. *J Infect*. 2006;52(1):56–60.
 15. Blacksell SD, Bryant NJ, Paris DH, Doust JA, Sakoda Y, Day NP. Scrub typhus serologic testing with the indirect immunofluorescence method as a diagnostic gold standard: a lack of consensus leads to a lot of confusion. *Clinical infectious diseases*. 2007 Feb 1;44(3):391-401.
 16. Rajapakse S, Rodrigo C, Fernando D. Scrub typhus: pathophysiology, clinical manifestations and prognosis. *Asian Pacific journal of tropical medicine*. 2012 Apr 1;5(4):261-4.
 17. Varghese GM, Abraham OC, Mathai D, Thomas K, Aaron R, Kavitha ML, Mathai E. Scrub typhus among hospitalised patients with febrile illness in South India: magnitude and clinical predictors. *Journal of Infection*. 2006 Jan 1;52(1):56-60.