

CLINICAL PROFILE OF PEDIATRIC SCRUB TYPHUS PATIENTS: A HOSPITAL BASED STUDYSunil Dutt Sharma¹, Ashu Jamwal², Tanvi³, Ghanshyam Saini⁴**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: BACKGROUND: Scrub typhus is an acute febrile illness caused by *Orientia tsutsugamushi*. The organism is transmitted during the bite of trombiculid mites. Field rodents are the reservoir hosts. The disease is endemic in many parts of India including the state of Jammu and Kashmir but is often under reported due to lack of diagnostic facilities. **AIM:** The aim was to study the clinical and epidemiological profile of pediatric scrub typhus patients reporting to the Department of Pediatrics, Government Medical College Jammu, a referral hospital for whole of Jammu region. **METHODS:** Prospective study conducted in the Department of Pediatrics Govt. Medical College Jammu from January 2011 to December 2011. A total of 90 children who reported with fever and rash or lymphadenopathy or both were tested using qualitative ELISA for IgM antibodies against *Orientia tsutsugamushi*. The clinical and epidemiological profile of 74 pediatric scrub typhus patients who tested positive for IgM ELISA for Scrub typhus was studied. **OBSERVATION:** Most (71.6%) patients were in the age group of 6-15 years. 83% of them reported in the months of September and October. One third of the patients belonged to Rajouri district. Common physical signs were fever (100%), rash (86.4%) and generalised lymphadenopathy (83.7%). Others included conjunctival congestion (44.59%), hepatosplenomegaly (36.48%), jaundice (22.97%), edema (18.91%), eschar (17.56%), meningeal signs (10.81%), and myocarditis (5.4%). Most of the children presented late with complications like hepatic dysfunction (55.4%), renal dysfunction (24.32 %), shock (4%) meningoencephalitis (9.4%), gastrointestinal haemorrhage (8.1%) and myocarditis (4.05 %), bronchopneumonia (4.05%) and multiorgan involvement (2.7%). Children were treated with chloramphenicol or doxycycline. There was no mortality in the study group. **CONCLUSION:** Scrub typhus is endemic in the Jammu region especially Nowshera-Sunderbani-Rajouri belt. Children with Scrub typhus can have severe complications but respond promptly to treatment. As good serological tests are not freely available in all endemic areas in the emphasis should be on the clinical diagnosis and prompt treatment.

KEYWORDS: Scrub typhus, Eschar, Rash.

INTRODUCTION: Rickettsial diseases are some of the most covert re-emerging infections of the present times. They are generally incapacitating and notoriously difficult to diagnose; untreated cases can have fatality rates as high as 30-35%, but when diagnosed properly, they are often easily treated. Scrub typhus is an acute febrile, infectious illness caused by *Orientia tsutsugamushi*, an obligate intracellular gram negative bacterium, which was first isolated in Japan in 1930.^(1,2) The disease has been reported from all parts of the world except Antarctica. In India it has been documented from Jammu and Kashmir, Himachal Pradesh, Uttranchal, Rajasthan, Assam, West Bengal, Maharashtra, Kerala and Tamil Nadu. Though some recent reports from several parts of India indicate that there is a resurgence of scrub typhus, the disease remains grossly underdiagnosed in India.

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The reported numbers are an underestimate due to lack of a community based data and non – availability of confirmatory laboratory tests.^(3,4,5,6)

It is a zoonotic disease transmitted by the bite of larval mites (Chiggers) of *Leptotrobidium deliense* group. These larval mites usually feed on wild rats. Man is accidentally infected when he encroaches the mite infested areas known as the mite islands through occupational/ agricultural exposure. The term scrub typhus is used because of the type of vegetation i.e. terrain between woods and clearing, that harbours the vector. However the name is not entirely correct because infection can occur in diverse habitats like seashore and semi-deserts. Active rice fields are an important reservoir for transmission. The natural reservoir of infection is the adult mite from which the organism passes to larva by transovarian transmission.^(7,8)

O.tsumugamushi multiplies at the inoculation site with the formation of a papule that ulcerates and becomes necrotic forming an eschar with regional lymphadenopathy that progresses to generalised lymphadenopathy. Humans develop an acute febrile illness in 8-10 days of chigger bite. The infection manifests clinically as a nonspecific febrile illness often accompanied by rash, headache, myalgias, nausea, vomiting, diarrhoea, cough and breathlessness. Generalised lymphadenopathy and hepatosplenomegaly are seen in a majority of scrub typhus patients. Severe life threatening manifestations include interstitial pneumonitis, non-cardiogenic pulmonary edema, meningo-encephalitis, acute renal failure and disseminated intravascular coagulation.^(1,8,9)

Microimmunofluorescence, immunoperoxidase, latex agglutination, indirect hemagglutination, ELISA, Dot blot immunoassay, and Weil Felix test are the various serological methods available for the diagnosis of rickettsial diseases. DNA PCR can be confirmatory.^(10,11)

MATERIAL AND METHODS: This prospective hospital based study was conducted in the Department of Pediatrics SMGS Hospital and Department of Microbiology, Government Medical College Jammu over a period of one year from Jan. 2011 to Dec. 2011. Indoor Pediatric patients aged 1-19 years, presenting with fever along with generalised lymphadenopathy or rash or both were screened for scrub typhus. Patients with clinically compatible measles and those with leukemia were excluded from the study. A total of 90 children were tested using qualitative ELISA for IgM antibodies against *Orientia tsutsugamushi*, using Kit: In Bios.

OBSERVATIONS: The present study includes 74 children who tested positive for IgM against scrub typhus. Most (71.6%) of them were in the age group of 6-15 years. Those reporting between 1-5 years, 6-10 years, 11-15 years and ≥ 16 years were 17.56%, 31.08%, 40.54% and 10.81% respectively. (TABLE I) There was slight male predominance, ratio being (1.09:1) (TABLE II). Almost all the districts of Jammu seem to be affected with one third of cases being reported from Rajouri District alone. Most of the cases belonged to Nowshera (13.5%), Sunderbani (9.5%), Rajouri (9.5%), Kathua (8.1%), Hiranagar (6.7%), Mendhar (6.7%), Poonch (5.4%), Reasi (6.7%) and Udhampur (5.4%). (Ref TABLE III) About 83% of the patients reported in the months of September and October, although 2.7%, 4.5% and 9.4% patients were also seen in July, August and November respectively. (TABLE IV) Common presenting symptoms were fever (100%), rash (58.1%) and abdominal pain (16.2%). Others symptoms included body aches (8.1%), black stools (9.4%), abnormal body movements (6.75%), headache (5.4%), facial puffiness (5.4%) and altered sensorium (4%). A few patients also had neck swellings, giddiness, cough, chest pain, vomiting, fast breathing and bluish discoloration of feet. (TABLE V). Among the signs, fever (100%), rash (86.4%) and generalised

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lymphadenopathy (83.7%) were the most common. Others included conjunctival congestion (44.59%), hepatosplenomegaly (36.48%), jaundice (22.97%), edema (18.91%), meningeal signs (10.81%), and myocarditis (5.4%). We could find eschar, a very significant clinical finding, in only 17.56% of the children. (TABLE VI) Most of the patients presented with complications like hepatic dysfunction (55.4%), renal dysfunction (24.32%), meningoencephalitis (9.04%) and gastrointestinal haemorrhage (8.1%), shock (4.05%) and myocarditis (4.05 %). Rare complications like peripheral gangrene, 3rd nerve palsy and pericardial effusion were also seen.

Age group (in years)	No	%
1-5	13	17.56
6-10	23	31.08
11-15	30	40.54
≥16	8	10.81

Table 1: Age Wise Distribution of the Patients

Sex	No	%
Males	40	54
Females	34	45.9

Table 2: Gender wise Distribution

Area	District	No	%
Nowshera	Rajouri	10	13.5
Sunderbani	Rajouri	7	9.5
Rajouri	Rajouri	7	9.5
Kathua	Kathua	6	8.1
Hiranagar	Kathua	5	6.7
Jindrah	Kathua	3	4.05
Billawar	Kathua	1	1.35
Mendhar	Poonch	5	6.7
Poonch	Poonch	4	5.4
Reasi	Reasi	5	6.7
Udhampur	Udhampur	4	5.4
Chenani	Udhampur	2	2.7
Ramban	Ramban	2	2.7
Sidhra	Jammu	4	5.4
Mirasahib	Jammu	2	2.7
Akhnoor	Jammu	1	1.35
Samba	Samba	1	1.35
Doda	Doda	1	1.35
Nagrota	Jammu	1	1.35
Paloura	Jammu	1	1.35

Table 3. Demographic areas of Jammu region

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Month	Patients	Percentage
July	2	2.7
August	3	4.05
September	39	52
October	23	31
November	7	9.4

Table 4: Month wise Distribution

Complaint	No	%
Fever	74	100
Rash	43	58.1
Abdominal pain	12	16.21
Body aches	6	8.1
Black stools	7	9.4
Abnormal body movements	5	6.75
Headache	4	5.4
Facial puffiness	4	5.4
Neck swellings	2	2.7
Altered sensorium	3	4.05
Vomiting	2	2.7
Fast breathing	2	2.7
Swelling feet	2	2.7
Bluish discoloration of foot	1	1.35
Cough	1	1.35
Chest Pain	1	1.35
Pallor	1	1.35

Table 5: Presenting Complaint

Examination Finding	No	%
Fever	74	100
Generalised Rash	64	86.4
Generalised lymphadenopathy	62	83.7
Conjunctival congestion	33	44.59
Hepatosplenomegaly	27	36.48
Jaundice	17	22.97
Hepatomegaly	16	21.62
Generalised Edema	14	18.91
Eschar	13	17.56
Splenomegaly	9	12.16
Meningeal involvement	8	10.81
Crackles/ ronchi	8	10.81
Gastrointestinal bleeding	7	9.4
Myocarditis	4	5.4
Congestive cardiac failure	1	1.3

Table 6: Distribution of study group according to the examination findings

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Complication	No	%
Hepatic dysfunction	41	55.40
Renal dysfunction	18	24.32
Meningoencephalitis	7	9.4
Gastrointestinal bleeding	7	8.1
Severe anemia	6	4.05
Shock	3	4.05
Myocarditis	3	4.05
Bronchopneumonia	3	4.05
Multiorgan involvement	2	2.7
Pericardial effusion	1	1.35
Third nerve palsy	1	1.35
Gangrene foot	1	1.35

Table 7: Complications

DISCUSSION: Scrub typhus is widely endemic in many countries of Asia. In India pediatric scrub typhus cases have been documented from Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Rajasthan, West Bengal, Maharashtra, Kerala and Tamilnadu.^(12,13,14,15,16) Kulkarni et al reported indoor admissions as high as 12%⁽¹⁷⁾ The total burden of the disease, however may be grossly under reported as most of the studies are hospital based. Also the serological tests, other than Weil Felix, are not freely available in most of the endemic areas. The infection presents as a nonspecific febrile illness with rash, lymphadenopathy, gastrointestinal, respiratory or central nervous symptoms, which if not diagnosed and treated early can lead to complications like myocarditis, pneumonia, meningoencephalitis, gastrointestinal bleeding, acute renal failure, ARDS like picture.^(18,19)

In the present study 71.6% of children were in the age group of 6 to 15 years, which could be due increased outdoor activity in this age group. Jim et al reported mean age of children as 7.6+/- 4.6 years whereas Huang et al observed a mean age 6.1 (3.66) among the hospitalised pediatric scrub typhus patients. The observed male to female ratio was 1.09: 1.^(14,15)

32.5% patients in our study belonged to the Nowshera- Sunderbani-Rajouri belt, which is comparable to incidence suggested by Digra et al.⁽¹²⁾ However almost all the districts of Jammu region seem to be affected with cases being reported not only from the hilly areas like Reasi, Poonch, Mendhar, Doda but also from the suburban areas like Samba, Sidhra, Mirasahib etc.

In our study children reported during the months of July to November with majority of the patients reported during the months of September (52%) and October (31%). Sirisanthana et al studied 30 Thai children with scrub typhus and observed that most were diagnosed during the rainy months of June to November.⁽¹⁹⁾

Fever, rash, lymphadenopathy and eschar are the most common symptoms of scrub typhus, and are important in the clinical diagnosis of this disease. In our series fever was present in 100% of the patients and the mean duration of fever was 6.45 (± 3.01 days), a finding comparable to the previous studies. Rash is considered as hallmark of rickettsial disease. A generalised maculopapular rash predominantly found over the peripheries including palms and soles was found in 86.8% of the patients. Generalised lymphadenopathy was also a common finding in our patients comprising a total

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of 83.7% of total patients in our study. Bilateral conjunctival congestion was observed in 44.59%. While 36.48% patient had both hepatosplenomegaly, 21.62% had only hepatomegaly and 12.16% had only splenomegaly. The findings are comparable to the earlier studies on pediatric scrub typhus patients.

Sirisantha V et al observed common physical signs as fever (100%), lymphadenopathy (93%), hepatomegaly (73%), eschar (68%), conjunctival hyperaemia (33%), maculopapular rash (30%) and splenomegaly (23%).⁽¹⁸⁾

Jim WT et al reported the clinical manifestations in 39 children with scrub typhus as fever (100%), cough (72%), anorexia (72%) eschar (69%), and lymphadenopathy (64%).⁽¹⁴⁾

Eschar was seen in only 17.56 % of our patients. Eschar at the site of attachment of the larval mite or chigger, is the most characteristic feature of scrub typhus, but not seen in all the patients. Eschar appears like an ulcer covered with a dark scab resembling a cigarette burn, seen mostly in the axilla and perineal region. Eschar was a common finding reported by Jim et al (69%), Huang et al (50%), Sirisanthana et al (68%) and Chanta et al (75%).^(14,15, 19,20)

Routine laboratory investigations do not have much of a diagnostic value in the diagnosis of scrub typhus. No rapid laboratory tests are available to diagnose rickettial infection early in the course of the disease. Of the various serological tests available indirect immunofluorescence is considered 'Gold Standard' but is not available in India. Only Weil Felix and ELISA are easily available in India. We included patients who tested positive for IgM ELISA in our study. Weil Felix has a poor sensitivity but still serves as a useful and cheap test for laboratory diagnosis of rickettial diseases. Issac et al have demonstrated that the sensitivity of Weil Felix was 30% at a break point titre of 1:80, but the specificity and positive predictive value were 100%. Prakash et al evaluated two specific serological tests, Dot enzyme immunoassay (EIA) and IgM ELISA and the Weil Felix test and found a sensitivity of 100%, 86.5% and 43.5% respectively.^(10,11,21)

Scrub typhus responds well to antibiotics like chloramphenicol, doxycycline and azithromycin. All the patients in our study were treated either with chloramphenicol or doxycycline. 84 % of the patients had defervescence within 48 hrs of starting the antibiotics, while 16% showed a defervescence after 48 hrs. There was no mortality in the study group. Chanta et al reported the use of chloramphenicol, doxycycline and roxithromycin for the treatment of the patients. Mahajan et al used azithromycin and doxycycline in their study group, while Dingra et al had reported the use of chloramphenicol alone.^(20,6,12)

Serious complications of scrub typhus usually occur in the second week of illness. The commonest complication observed on our case was hepatic dysfunction which was seen in 47.72% of the patients. Huang et al reported an elevated AST in 100% of the cases and ALT raised in 91.3% patients while Chanta et al reported elevated levels of AST and ALT in 90% and 75% of the cases studied. In our study renal functions were deranged in 20.46% of the patients while Dingra et al reported it in 4.7% of the patients.^(15,20,12) Abnormal X-ray findings were seen in 12.5% cases in our study. Bilateral infiltrates was the commonest finding. Despite the presence of serious complications there was no mortality in the study group.

The true incidence of scrub typhus is probably much higher because tests for anti-O.tsumugamishi antibody are not freely available in Jammu region. Seroepidemiological studies are needed to determine the exact community burden of the disease.^(22,23)

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CONCLUSION: Scrub typhus, an acute febrile illness caused by *Orientia tsutsugamushi*, should be suspected in children presenting with high grade fever, rash, conjunctival congestion, lymphadenopathy and hepatosplenomegaly especially in children coming from endemic areas. Presence of eschar, caused by the bite can be diagnostic. Prompt treatment with appropriate antibiotic produces dramatic response where as a delay in diagnosis and treatment can lead to serious complications and can be life threatening. As good serological tests are not freely available in all endemic areas in the emphasis should be on the clinical diagnosis and prompt treatment.

The present study is a hospital based study but clearly points out the areas of high endemicity. The true incidence of scrub typhus is probably much higher because tests for anti-*O. tsutsugamushi* antibody are not freely available in Jammu region.

Seroepidemiological studies need to be undertaken in these endemic areas to assess the community burden of the disease and plan preventive measures.

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