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Original Research Article

A study of clinical and laboratory profile of scrub typhus in children in a tertiary hospital in South India

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ABSTRACT

Background: Scrub typhus is an acute febrile illness caused by infection with *Orientia tsutsugamushi*. The present study was conducted to study the clinical features, laboratory profile, complications and response to therapy among children suffering from scrub typhus in a tertiary health care institution of Tamil Nadu, India.
Methods: The study was conducted at Saveetha Medical College Hospital, Tamil Nadu, India. Duration of the study was from August to December, 2015 in the Department of Pediatrics. Children with clinically suspected Scrub typhus were subjected to detailed clinical examination and investigation. Diagnosis of scrub typhus was confirmed by IgM ELISA.
Results: 34 patients were diagnosed as suffering from scrub typhus. Common symptoms noted were fever, headache, cough and cold, chills, rigor, myalgia and vomiting. The common complications noted were thrombocytopenia in 16 children (47%) and features of meningoencephalitis and hepatitis were present in 2 children (5.8%). Eschar was identified in 24 (70.5%) patients. Mixed infection was seen in 4 (11.7%) children who had concurrent culture positive Urinary Tract Infection.
Conclusions: Scrub typhus is an acute febrile illness which requires high index of suspicion for early diagnosis, monitoring of the clinical and laboratory parameters and prompt treatment which may help in complete cure without further complications and morbidity.

Keywords: Eschar, Outcome, Scrub typhus

INTRODUCTION

Scrub typhus is a vector borne bacterial infection caused by *Orientia tsutsugamushi*. "Tsutsuga" means small and dangerous and "mushi" means insect or mite.[1] The term "Scrub" is used because of the type of vegetation where the vector is commonly found (terrain between woods and clearings).[1]

It is a zoonotic disease that is transmitted to humans by the arthropod vector of the Trombiculidae family and predominantly occurs during the cooler months of the year as well as during the rainy season.

Scrub typhus is known to be prevalent in foot hills of Himalaya's viz. Jammu and Kashmir, Sikkim, Manipur, Nagaland, Meghalaya, Himachal Pradesh as well as south India states of Tamil Nadu, Puducherry and Kerala.[1]

It presents as an acute febrile illness in children and the severity is varying among patients. The common presentation of scrub typhus is fever, headache, myalgia, lymphadenopathy, hepatosplenomegaly with varying involvement of the major organs.[1,2] *O. tsutsugamushi* infects the endothelium of the small blood vessels and causes vasculitis which may result in severe complications such as acute respiratory distress syndrome

(ARDS), hepatitis, renal failure, meningo-encephalitis and myocarditis and shock.[2,3] The diagnosis is confirmed by serological testing.[1] Mortality rates in untreated patients range from 0% to 30% and tend to vary with different geographical regions.[1,3]

METHODS

This prospective study was conducted in the Paediatric department at Saveetha Medical College hospital, Chennai, India which is a tertiary care hospital. The study was conducted for a period of 5 months from August 2015 to December 2015. Institutional ethical clearance was obtained. All children admitted with undiagnosed acute febrile illness were enrolled in the study. After obtaining a detailed history and clinical examination, the children were subjected to a series of investigations that included complete blood counts, peripheral smear examination, blood culture, urine examination, urine culture, serum widal test (if febrile period is more than 7 days), dengue serology, leptospira antibody titer, IgM antibody ELISA for scrub typhus, chest X ray, ultrasound abdomen and liver function tests.

Those children who were diagnosed as scrub typhus based on positive IgM antibody test were further analysed.

RESULTS

Out of total 231 children who were admitted with undifferentiated acute febrile illness during the study period, 34 children were diagnosed to be suffering from scrub typhus with positive IgM ELISA. The age of presentation of children in the study ranged from 4 years to 15 years. 18 children (52.9%) were female and 16 (47.1%) were male children (Table 1).

Table 1: Age and sex wise distribution of scrub typhus cases.

Age (years)	Male	Female	Total
4-6	4 (25%)	4 (22.2%)	8 (23.5%)
6-10	4 (25%)	4 (22.2%)	8 (23.5%)
11-15	8 (50%)	10 (55.5%)	18 (52.9%)
Total	**16 (47%)**	**18 (52.9%)**	**34 (100%)**

Fever was the commonest symptom seen in all 34 children (100%). The duration of fever was ranging between 5 to 22 days and average duration of fever was 8.5 days. Headache and respiratory symptoms were the commonest associated symptoms. Generalized muscle pain was present in 11 (32.3%) children, headache was present in 22 (64.7%), diarrhea was complained by 5 (14.7%), vomiting in 10 children (29.4%) and abdominal pain was present in 9 (26.5%) children (Table 2).

On examination, the findings noted were hepatomegaly in 21 children (61.8%) splenomegaly in 3 (8.8%), regional lymphadenopathy was present in 8 (23.4%) and jaundice in present in 2 children (5.8%). In 24 children (70.5%) an eschar was detected after careful examination in various sites like axilla, behind the ears, groin, back and chest wall (Table 4).

Table 2: Clinical manifestation of children with scrub typhus.

Criteria	No. of cases (N = 34)
Fever	34 (100%)
Headache	22 (64.7%)
Cough and cold	22 (64.7%)
Chills and rigor	20 (58.8%)
Hepatomegaly	21 (61.8%)
Splenomegaly	3 (8.8%)
Abdominal pain	9 (26.5%)
Myalgia	11 (32.3%)
Vomiting	10 (29.4%)
Diarrhea	5 (14.7%)
Burning micturition	6 (17.6%)
Pneumonitis	2 (5.8%)
Meningoencephalitis	2 (5.8 %)
Pedal edema	2 (5.8%)
Jaundice	2 (5.8%)
Pallor	14 (41.1%)
Lymphadenopathy- cervical	6 (17.6%)
Lymphadenopathy- Axillary	2 (5.8%)
Conjunctival congestion	2 (5.8%)
Coated tongue	2 (5.8%)

Table 3: Hematological and biochemical findings in scrub typhus patients.

Criteria	No. of cases (N = 34)
Thrombocytopenia	
<50000	6 (17.6%)
50000 - 1 lakh	10(29.4%)
1-1.5 lakh	5 (14.7%)
Leucocytosis	6 (17.6%)
Leucopenia	4 (11.7%)
Serum bilirubin (> 2md/dl)	2 (5.8%)
Serum albumin (<3 mg/dl)	8 (23.5%)
Elevated liver enzymes	9 (26.4%)

CNS manifestations with features of meningoencephalitis was present in 2 (5.8%) children while 2 children presented with features of hepatitis.

16 (47%) patients had thrombocytopenia, 6 (17.6%) patients had leukocytosis and 4 (11.7%) had leucopenia. Serum bilirubin was raised (>2.0 mg/dl) in 2 (5.8%) children, hypoalbuminemia was seen in 8 (23.5%) patients (Table 3). Mixed infection was detected in 4 patients, who had culture positive urinary tract infection. All the children were started on either oral doxycycline or azithromycin along with supportive care. In majority of

patients (94.1 %) the fever subsided within 24-48 hours. All the children recovered completely following antibiotic therapy.

Table 4: Site of eschar 24 (70.5%).

Site	Number
Neck	1 (2.9 %)
Behind ear	3 (8.8%)
Axilla	6 (17.6%)
Genitals	4 (11.7%)
Inguinal region	2 (5.8%)
Scrotum	2 (5.8%)
Back	1 (2.9%)
Chest wall	3 (8.8%)
Lower limb	2 (5.8%)

DISCUSSION

The seasonal occurrence of scrub typhus varies with the climate in different countries. The period of infection is influenced by the activities of the infected mite. It occurs more frequently during the rainy season.[1] In a study by Varghese G et al from South India, they reported an increase in cases of scrub typhus in the cooler months. The highest number of cases were reported in October, December and January in the period immediately after the Southeast and Northwest monsoon in Tamil Nadu.[4] Majority of cases of scrub typhus in our institution are also seen during the cooler months and rainy season between months of August and December. Similar finding has been reported in earlier studies. In another study by Gupta VK et al cases of scrub typhus has been reported from dry regions like Rajasthan.[5]

Scrub typhus can be a mild, moderate or severe febrile illness with nonspecific clinical features. Fever was the commonest symptom which was reported by all patients in our study. These finding was consistent with other studies who also reported fever as the commonest presenting feature.[6,7]

In some studies myalgia and headache has been reported as the commonest symptom.[8] Apart from that, the common symptoms were headache, vomiting, cough and cold and lymphadenopathy.

In a study conducted in an urban referral center by Palanivel S et al in Chennai 46% children with scrub typhus had eschar, 35% children had rashes, hepatosplenomegaly and pallor was present in 80% whereas 77% had thrombocytopenia, elevated liver enzymes in 64% and leukocytosis in 49% of children.[6] An eschar at the site of the chigger mite bite is pathognomonic of Scrub typhus.[9] Regional or generalized lymphadenopathy is common.

In our study, more number of children had eschar, 70.5% children had eschar whereas rashes was not commonly seen. One child had multiple eschars over the body. 23.4% children had regional lymphadenopathy whereas none had generalized lymphadenopathy. 61% children had hepatomegaly while only 8.8% had splenomegaly which is lower than other studies. Comparatively, in our study fewer children had pallor (41%) and elevated liver enzymes was present in only 26% of children.

In another study published by Varghese GM et al, eschar was present in 43.5% of patients.[3] The disease may get complicated by interstitial pneumonitis, meningoencephalitis, myocarditis, hepatitis, acute kidney injury, or adult respiratory distress syndrome.

In a study published by Palanivel et al pleural effusion, ascites, shock and respiratory failure were seen in 61%, 47%, 45%, 34% cases, respectively.[6] Acute kidney injury, hepatic failure, multiorgan dysfunction syndrome (MODS), meningoencephalitis and acute respiratory distress syndrome (ARDS) were seen in 10%, 10%, 7%, 6% and 4% cases, respectively.[6] In the present study fewer complications were detected with meningoencephalitis, hepatitis and pneumonitis in 5.8% of patients. The reason may be because of smaller sample size in our study as well as earlier patient referral to tertiary care institutions for diagnosis and treatment.

Blood investigation revealed leukocytosis, thrombocytopenia, and low serum albumin. Low serum albumin and leucocytosis are thought to be associated with severe scrub typhus.[6] Complications in scrub typhus develop after first week of illness and are directly related to the blood load of *O. tsutsugamushi.*

All the children were started on doxycycline or azithromycin therapy. In a study published from North India by Bhat NK et al 90% became afebrile within 48 hours of starting appropriate antibiotics with an overall mortality rate of 7.5%.[7] Our patients similarly responded well to antibiotic therapy, 94.11% children became afebrile within 48 hours of initiation of therapy. Mortality rate in scrub typhus varies from 0 to 33.5%.[6] Recovery was complete in all patients and there was no mortality in the present study.

CONCLUSION

There is a need for increased awareness of this illness among health professionals so that early diagnosis and treatment can be initiated in order to reduce the risk of complications and mortality. A high index of suspicion is needed while treating children presenting with fever especially during rainy season. Fever, headache, myalgia, hepatomegaly, gastrointestinal symptoms are the common

clinical features among children suffering from scrub typhus. Hepatitis, meningoencephalitis, renal failure and ARDS can complicate the course of illness if diagnosis is delayed.

Though eschar is pathognomonic of the disease, its absence does not rule out scrub typhus. Since eschars are painless and usually occur in the groin, genitals and axilla, they often go unnoticed by the patient and careful physical examination is required by health care professionals.

Most patient respond well to treatment with doxycycline or macrolides antibiotics. Empirical therapy can be started in scrub typhus endemic areas with high clinical suspicion to prevent morbidity and mortality. Role of public health measures like wearing protective clothing and using miticidal drugs for prevention may be required.

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