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Original Research Article

Epidemiology, clinical profile and laboratory parameters of scrub typhus cases in West Bengal

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Abstract

Context: Scrub typhus is an acute febrile illness caused by *Orientia tsutsugamushi*. It is a re-emerging rickettsial disease known to occur all over India. Also no data exists as to what proportion of fever cases are due to scrub typhus in West Bengal.

Aims: This study was aimed at identifying the proportion of *Orientia tsutsugamughi* infection among the patients presenting with acute febrile illness and their epidemiological characteristics, clinical profile and laboratory parameters.

Methods and Material: Blood samples of patients suffering from acute undifferentiated febrile illness for more than five days duration were collected from different hospitals of Kolkata and IgM capture Enzyme Linked Immuno-Sorbant Assay (ELISA) was performed at referral virology laboratory of School of Tropical Medicine, Kolkata over the period, April 2017 to March 2018.

Results: 89 cases were found reactive for scrub typhus IgM out of 259 suspected cases (34.36%). Scrub typhus was mainly prevalent in children with slight male predilection. Most of the patients were from rural belt with a history of poor housing conditions. The common symptoms associated with fever were headache, nausea/vomiting, cough and skin rashes. Common signs were hepatomegaly, splenomegaly, followed by eschar and lymphadenopathy. Important laboratory findings were anaemia, leucocytosis, thrombocytopenia, and elevated liver enzymes whereas serum urea/creatinine level was almost within normal limits. There was no mortality.

Conclusions: In this study 34.36% of febrile patients (duration of fever ≥ five days) were positive for scrub typhus. So it needs to be included in the differential diagnosis of febrile illness in West Bengal.

Keywords: Acute febrile illness, Scrub typhus, West Bengal, *Orientiatsutsugamushi.*

Key message: Apart from Dengue, Scrub typhus is an important differential diagnosis of acute febrile illness in West Bengal.

Introduction

Scrub typhus is caused by *Orientia tsutsugamushi*, an obligate intracellular gram negative bacteria, which is transmitted by the bite of larva of trombiculid mites (chiggers).[1] Following incubation period (6-21 days) patient develops fever, headache, myalgia, generalised lymphadenopathy, cough, gastrointestinal symptoms, rash, and eschar.[2] Delay in diagnosis and initiation of treatment can result in severe complications even death.[3]

Scrub typhus is endemic to a part of the world known as *tsutsugamushi* triangle.[4] The disease is endemic in India, but is grossly under-diagnosed owing to the non-specific clinical presentation, lack of specific diagnostic facilities, and low index of suspicion by the clinicians.[5]

Materials and Methods

Serum separated from clotted blood samples (about three ml) were referred and submitted to the referral Virology laboratory at the Calcutta School of Tropical Medicine from 259 hospital admitted patients suffering from acute febrile illness (fever ≥ five days) during the period April 2017 to March 2018. Common causes of acute febrile illness in West Bengal, namely, Dengue (NS1/IgM), Malaria, Typhoid fever and chikungunya were ruled out. Specimen collection was as per standard protocol and transportation was strictly monitored maintaining cold chain. Serum samples were stored at 4^0 C in the refrigerator and tested within 24- 48 hrs. The study protocol was reviewed and approved by the Institutional Clinical Research and Ethics Committee.

IgM antibody capture (MAC) ELISA was performed by In Bios international Inc Scrub Typhus Detect™ IgM ELISA system. The samples were tested strictly following the manufacturer's protocol.

Results

Out of 259 serum samples, tested during the period April 2017 to March 2018, 89 were found to be Reactive by IgM ELISA test for scrub typhus (34.36%).

Among them 46 cases (51.68%) were male and 43(48.32%) were female.

About 74(83%) patients had history of outdoor exposure either due to occupation or during recreation. Most of patients under our study were from rural areas with poor

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housing conditions, i.e 64 patients (72%) had history of residing in kachcha houses with mud floor.

The distribution of the scrub positive cases in different age groups (Fig. 1) during the study period showed that highest no of cases belonged to the age group (0—5) years [52 seropositive cases out of 117 tested i.e.44.44%, P value 0.0019].

Month wise distribution (Fig. 2) revealed that maximum number of scrub typhus fever cases were found during monsoon and post-monsoon period (August-11 cases, September-14 cases, October-18 cases, November-23 cases) while least number of scrub typhus IgM seropositive cases were detected during the months of January, February and March.

Majority of the cases (Fig. 3) were from North 24 Parganas (36 cases, i.e 40.45%) followed by Howrah and South 24 Parganas (both district had 11cases i.e12.36%) and then Kolkata (8 cases i.e 8.99%).

The common symptoms (Table 1) associated with fever were nausea/vomiting (65.17%), bodyache (61.80%), headache (50.56%) and cough (41.57%) followed by maculo-papular skin rash (43.82%) and abdominal pain (21.35%). The pathognomonic features such as lymphadenopathy and eschar were found among 19(21.35%) and 16(17.98%) patients respectively. 11 patients (12.36%) presented with altered sensorium while 15(16.85%) patients had history of convulsion. The common signs seen were hepatomegaly (48.31%) and splenomegaly (21.35%). Edema (7.87%) was found in few patients only.

Table 2 and Fig. 4-7 vividly describes the laboratory parameters of Scrub typhus cases seen in West Bengal.

Most of the patients were treated with Doxycycline (in case of adult 100mg twice daily for seven to ten days and 4mg/kg body weight in case of children). Few paediatric patients were also treated with Azithromycin (10mg/kg body weight/day).

All the patients in this study recovered completely and were discharged without any residual impairment.

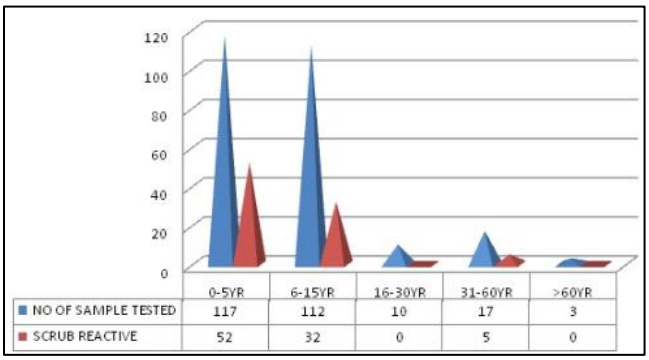

Fig. 1: Distribution of scrub typhus cases among different age groups

Fig. 2: Monthly distribution of scrub typhus fever cases

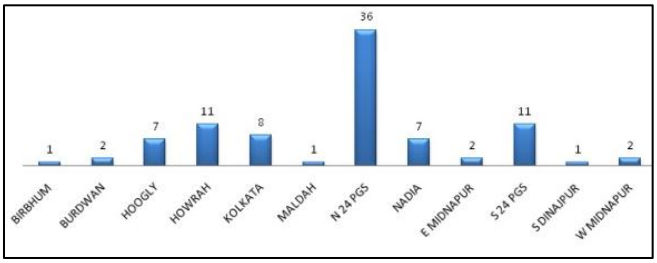

Fig. 3: District wise distribution of scrub typhus reactive cases (n = 89)

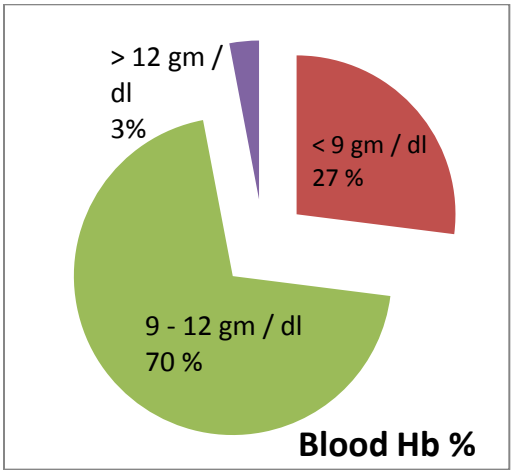

Fig. 4: Various Hb% among scrub typhus patients

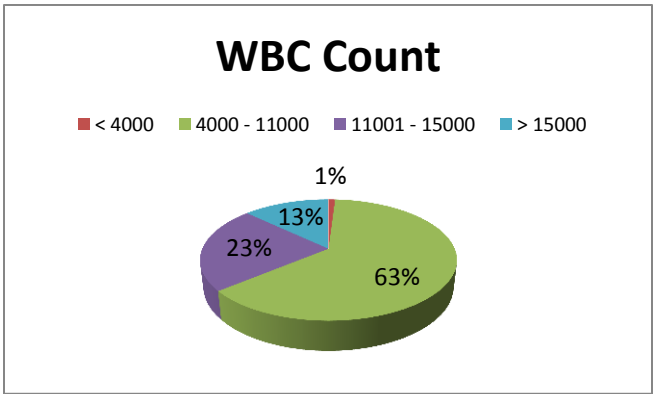

Fig. 5: Leucocyte count among patients suffering from scrub typhus.

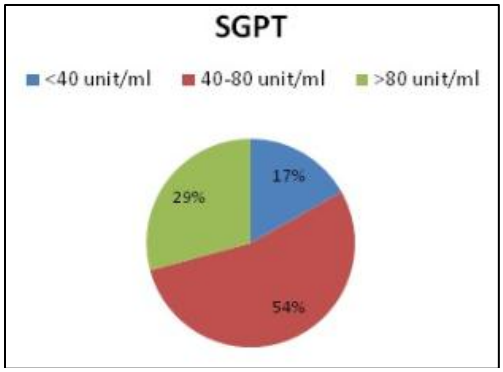

Fig. 6: Serum SGPT levels among scrub typhus patients

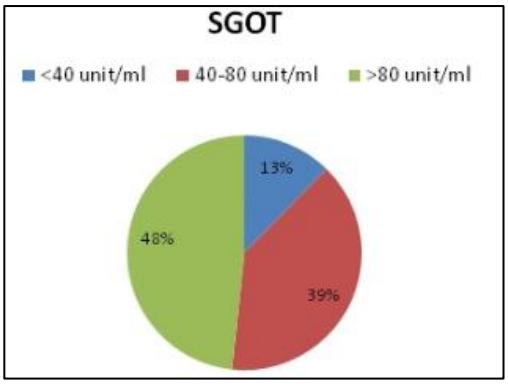

Fig. 7: Serum SGOT levels among scrub typhus patients

Table 1: Clinical Characteristics of the Scrub typhus cases included in the study

Symptoms	No of patients n=89 (%)
Fever	89(100%)
Nausea/vomiting	58(65.17%)
Bodyache	55(61.80%)
Headche	45(50.56%)
Maculopapular skin rash	39(43.82%)
Cough	37(41.57%)
Eschar	16 (17.98%)
Signs	**No of patients n=89 (%)**
Hepatomegaly	43(48.31%)
Splenomegaly	19(21.35%)
Lymphadenopathy	19(21.35%)
Convulsion	15(16.85%)
Altered sensorium	11(12.36%)

Table 2: Laboratory investigations of Scrub typhus IgM reactive cases

Laboratory parameters	No of patients n=89 (%)
Blood for Hemoglobin (< 9 gm/dl)	24(26.97%)
Leukocyte count > 11000/ mm^3	32(35.96%)
Thrombocyte count<1X 10^5/µl	03(3.37%)
Thrombocyte count (1-1.5)X 10^5/µl	43(48.31%)
Serum bilirubin (1-3) mg%	10(11.24%)
Serum bilirubin >3 mg%	03(3.37%)
Serum SGPT (> 80 IU/L)	26(29.21%)
Serum SGOT (> 80 IU/ L)	43(48.31%)

Discussion

In the year 1999 WHO stated that "scrub typhus'' is probably one of the most under diagnosed and under reported febrile illness.[6] About One million cases of scrub typhus occur each year with an estimated fatality of 10% unless treated appropriately and can result in more deaths than dengue.[7]

The burden of the disease is more in rural Asia, where studies show scrub typhus causes up to 20% of febrile hospital admissions.[8]

In India, Scrub typhus was first reported from the states of Assam and West Bengal during World War II.[9]The disease is now reported from many endemic pockets of different states of India including West Bengal. But no data exists as to what proportion of fever cases is due to Scrub typhus in the state of West Bengal. Although it is endemic, it is grossly under-diagnosed due to its non-specific clinical features, low index of suspicion among physicians and dearth of diagnostic facilities.

In our present study many scrub typhus IgM reactive cases were detected from different districts of West Bengal during the period April-2017 to March-2018.

Scrub IgM seropositivity among our study population was 34.36% which is almost similar with the study conducted by Narvenca r*et al*[10] (34%) at a tertiary health care institution in Goa.

52 out of those 89 seropositive cases were below 5 years of age, i.e 58.43% which corroborate with most of the previous studies.

We noticed a slight male preponderance [male-51.68%, female- 48.32%] which can be explained by more exposure to chigger bites while playing or working outdoors with bare bodies.

In our study most of the cases were seen during the months of August to November. Such a monsoon and a post-monsoon upsurge of cases can be explained by two factors. First, the higher incidence of scrub typhus during rainy and autumn season may be due to increased human activities in the agricultural fields and bushes during these periods. Secondly, in the immediate post-monsoon period [September to early month of next year], there is growth of secondary scrub vegetation, which is the habitat for trombiculid mites (mite islands).[11]

Scrub typhus is an acute febrile illness with various non-specific signs and symptoms. In our study common presentations were fever (100%), nausea/vomiting (65.17%), body ache (61.80%), headache (50.56%) and cough (41.57%) followed by maculopapular skin rash (43.82%) and abdominal pain (21.35%). All these symptoms varied from time to time and in different studies.

In our study, 58(65.17%) patients presented with vomiting whereas study conducted by Kumar *et* al[12] found vomiting among 49% cases but according to the study of Narvencar *et al*,[10] 100% patients presented with nausea and vomiting.

37(41.57%) patients complained of cough which closely corroborates with the study of Narvencar *et al*.[10]i.e 46.7%.

Maculopapular skin rashes were seen among 39 (43.82%) patients out of 89 diagnosed cases of scrub typhus. In this aspect our study result was similar to report given by Rizvi *et al*[13] (45%).

Rashes were found less in our study when compared to other studies. It may be because of the fact that most of the patients being residents of tropical countries were of dark complexion in whom rashes can be easily missed.

Though eschar is pathognomonic of scrub typhus, in our study it was seen only in 16 patients i.e. 17.98%. Nineteen(21.35%)out of the 89 sero-positive cases had lymphadenopathy and this finding corroborates with the finding of Rizvi *et al*,[13] i.e. 21.9%.

About 11(12.36%) patients presented with altered sensorium and 15(16.85%) patients presented with convulsion in our study. Whereas study conducted by Kumar *et* al[12] in a tertiary care hospital in South India, 17% patients presented with altered sensorium and convulsion was found in 11% cases.

The main difference of the two afore-said studies is that the study of Kumar *et al*[12] included only pediatric patients but our present study population is a mixed one having both pediatric and adult patients.

Edema was a rare presentation (7.87%) in our study which corroborates with the study of Dr. Murali Krishnan *et al*[14] i.e 8%.

Present study diagnosed 43(48.31%) patients having enlarged liver and 19(21.35%) patients having splenomegaly. These findings seemed to be quite variable in different studies.

Though both leucocytosis (>11000 cells/mm^3) and leucopenia (<4000 cells/mm^3) can be seen in scrub typhus, only 32 (35.96%) patients showed leucocytosis in our study. Only one patient showed leucopenia. Kante *et al*[15] conducted a study over a period of January-2013 to December-2016 which showed leucocytosis among 32.5% cases but 52.5% patients had leucopenia.

Dr. Murali Krishnan *et al*[14] found thrombocytopenia (< 150000/ mm^3) among 55% cases in their study whereas in our study total 46 (51.68%) patients presented with thrombocytopenia (≤150000) and only three (3.37%) patients among them had thrombocyte count below 100000/mm.[3]

Jaundice was relatively a rare finding in our study. Serum bilirubin level more than normal limit (>1mg/dl) was found among 14.61% cases among which only 3.37% cases had more than 3mg/dl serum bilirubin. Study by Rizvi *et al* [13] detected similar findings where abnormal serum bilirubin was found only in 12% of cases.

In our present study, 29.21% and 48.31% cases showed increased serum Alanine Aminotransferase(ALT/previously Serum Glutamate Pyruvate Transferase) and serum Aspartate Aminotransferase (AST/ previously Serum Glutamate Oxaloacetate Transferase) respectively. This result reflected that serum AST levels were much more increased in comparison to serum ALT among the scrub typhus patients. Similar findings were seen in the study of Kante *et al*[15] where abnormal serum AST and ALT level were found among 61% and 28.2% of cases respectively.

Renal dysfunction as indicated by serum creatinine level was almost absent in our study. Mean value of serum creatinine was 0.51mg% and only two patients had creatinine level more than 1mg%.

18 patients were advised for chest X-ray, among which five patients showed small amount of pleural fluid and patchy opacities in lung field were found only in four patients. Six patients were advised for echocardiography. Among them four patients were detected having thin film of pericardial fluid and only two patients had left ventricular dysfunction.

One of the patients who tested sero-positive for scrub typhus also tested positive for Widal test. Clinical manifestations did not hint at the worsening of clinical symptoms of the patient, as expected for the co-infections. Since Widal is non-specific test, it's positive result may indicate previous infection.

5/89 and 4/89 samples were found to be positive for dengue IgM and Chikungunya IgM along with a positive scrub typhus IgM result. Clinically Dengue, Chikungunya and Scrub typhus have considerable similarities.

The patients were treated with either Doxycycline (100mg BD for 10 days in adult and 5mg/kg body weight/day in children) or Azithromycin (10mg/kg body weight/day especially in children) and recovery was uneventful without any residual impairment.

Conflict of Interest

None.

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