



Original Research Article

Prevalence of scrub typhus in children among acute fever in a tertiary care hospital

Budhia Majhi¹, B Maheswar Rao^{1,*}, Saroj Sekhar Rath¹, Saroj Ku. Barma¹¹Dept. of Pediatrics, MKCG Medical College and Hospital, Brahmapur, Odisha, India

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ABSTRACT

Introduction: Scrub typhus along with other rickettsial infections are under-diagnosed in India because of their non-specific clinical presentation, low index of suspicion among physicians and lack of diagnostic facilities. It is a common cause of acute febrile illness in India. Scrub typhus can lead to different complications such as refractory shock, meningoencephalitis, acute respiratory distress syndrome, bronchopneumonia, acute kidney injury and myocarditis. In southern part of Odisha, there are limited studies of scrub typhus available in children. With this background this study was conducted to estimate the prevalence of scrub typhus in children presenting with acute febrile illness of more than or equal to five days in a tertiary care teaching hospital.

Materials and Methods: This was a cross sectional study carried out on a convenience sample of 283 children aged 2 to 14 years during the period from October 2017 to September 2019 in the O.P.D and I.P.D of the Department of Pediatrics, M.K.C.G. Medical College and Hospital, Berhampur. All children with acute undifferentiated fever of more than or equal to 5 days duration were included in the study. All confirmed cases of scrub typhus had a positive serology. Serology was done in all children who had fever for more than or equal to five days. Those with positive serology for scrub were studied in detail in relation to demography, clinical features and hematological profile. Data was presented as percentage and mean \pm SD.

Results: During the study a total of 283 children with ≥ 5 days of acute fever aged between 2 to 14yrs were evaluated. Out of the total samples analyzed, 100 (35.5%) cases were diagnosed to be positive for scrub typhus by IgM ELISA, 72 (25.4%) for malaria, ARI cases found to be 26 (9.1%), sickle cell disease with sepsis in 22 (7.7%), typhoid in 19 (6.7%) cases, dengue in 21 (7.4%), acute bacterial meningitis in 12 (4.2%) cases and leukemia was found in 11 cases (3.8%). Most of the cases of scrub typhus were in the age group 2 to 6 years with a male preponderance and a peak occurrence in the month of September, showing a typical seasonal pattern.

Conclusion: The prevalence of scrub typhus was 35.5% among children with acute undifferentiated fever lasting five days or more with a seasonal pattern with a post monsoon and early winter surge.

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1. Introduction

Scrub typhus, a zoonotic disease caused by bite of a larval trombiculid mite, popularly known as a chigger. It is caused by *Orientia tsutsugamushi*, an obligatory intracellular bacteria. There is an increased prevalence of scrub typhus

cases in the recent past. It remains as a common cause of an acute febrile illness in children and is re-emerging as an important illness of public concern especially in children.¹⁻³ Scrub typhus along with other rickettsial infections are under-diagnosed in India because of their non-specific clinical presentation, low index of suspicion among physicians and lack of diagnostic facilities.⁴ Scrub

* Corresponding author.

E-mail address: drmahes30mk@gmail.com (B. M. Rao).

typhus usually presents with moderate to high grade fever, local or generalized lymphadenopathy, hepatosplenomegaly, oedematous look and presence of typical eschar in many cases. Eschar is a small painless ulcer, non itching, black scab (cigarette burn) with or without surrounding erythema around the ulcer.¹

It is a common cause of acute febrile illness in India. In a recent study in Odisha, acute febrile illness in children under <15 year, the prevalence of scrub typhus cases was found to be 48.7% of the cases and around 5.5% of them developed systemic complications.² A late presentation, delay in diagnosis and treatment causes overall 11.1% deaths in children below 10 years because of low index of suspicion, and non-specificity of signs and symptoms.⁵ Scrub typhus can lead to different complications such as refractory shock, meningoencephalitis, acute respiratory distress syndrome, bronchopneumonia, acute kidney injury and myocarditis.⁶ In southern part of Odisha, there are limited studies of scrub typhus available in children. With this background this study was conducted to find out the different etiologies of acute fever of more than or equal to five days with special reference to scrub typhus.

2. Primary Objective

To estimate the prevalence of scrub typhus in children presenting with acute febrile illness of more than or equal to five days in a tertiary care teaching hospital.

3. Materials and Methods

The prospective observational study was carried out on a convenience sample of 283 children aged 2 to 14 years during the period from October 2017 to September 2019 in the O.P.D and I.P.D of the Department of Pediatrics, M.K.C.G. Medical College and Hospital, Berhampur. All children with acute undifferentiated fever of more than or equal to 5 days duration were included in the study. All the study participants had a positive serology for scrub typhus. The details were recorded in a structured proforma. The participants with an identifiable illness such as measles, chickenpox, abscess, clinical pneumonia and those with chronic illness and malnutrition were excluded from the study. Participants with less than 5 days of fever were excluded from the study.

As per the unit protocol the participants with acute fever ≥ 5 days were subjected for routine investigations including complete blood count, peripheral smear comment, Malaria test, typhoid test, sickling test, urine routine and culture. Renal function test, liver function test, C-reactive protein, chest X-ray and CSF study were done when clinically indicated. Scrub typhus was confirmed by IgM ELISA using INBIOS kit for scrub typhus which is 91% sensitive and 100% specific. Serology was done in all children who had fever for more than or equal to five

days. Those with positive serology for scrub were studied in detail in relation to demography, clinical features and hematological profile. Data was presented as percentage and mean \pm SD. Data analysis was performed using Microsoft excel and GraphPad Prism Free trial version 7.0 software. Chi square test was used to find out the association between the independent and dependant discrete variables. Statistical significance was considered as $p \leq 0.05$.

3.1. Sample size calculation and sampling technique

Assuming the prevalence of scrub typhus in acute febrile illness in children under <15 year to be about 12% from available literature,⁷ the sample size was calculated to be 83 at a precision of 7% with a desired confidence level of 95%. Taking a response rate to be 90%, finally 100 cases of scrub typhus were included in the study.

4. Results

During the study a total of 283 children with ≥ 5 days of acute fever aged between 2 to 14 yrs were evaluated. Out of the total samples analyzed, 100 (35.5%) cases were diagnosed to be positive for scrub typhus by IgM ELISA, 72 (25.4%) for malaria, ARI cases found to be 26 (9.1%), sickle cell disease with sepsis in 22 (7.7%), typhoid in 19 (6.7%) cases, dengue in 21 (7.4%), acute bacterial meningitis in 12 (4.2%) cases and leukemia was found in 11 cases (3.8%). Out of total scrub typhus cases, most of the cases were in the age group 2 to 6yrs (50%). There was a male preponderance, with a male to female ratio of 1.4:1. More number of scrub cases were found from rural area. In our study, it was observed that there was an increased incidence of cases from August to November with peak in the month of September, showing a typical seasonal pattern. In the present study common clinical features present were vomiting (56%), cough (31%), edema (30%), abdominal pain (26%) and headache (20%) in addition to fever. Hepatomegaly was present in 84% cases, splenomegaly in 72%, lymphadenopathy in 54% and pallor in 44% of cases. Icterus was seen only in 5% of cases. Eschar was present in 59 cases (out of total 100), majority of eschars were found in the axillary area (22%) and groin (20%).

Table 1: Socio-demographic variables of scrub typhus

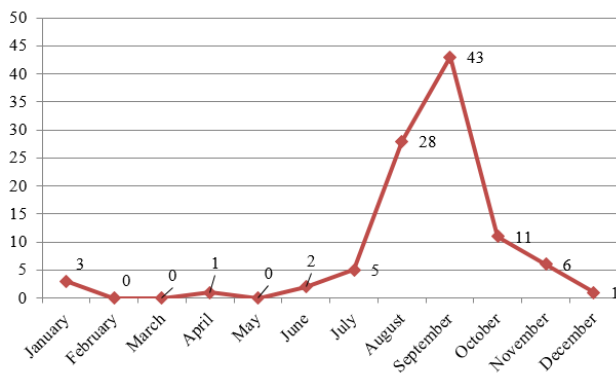
Study variables	Number (%) n=100
1. Age groups	
2-6yrs	50 (50%)
7-9yrs	25 (25%)
10-14yrs	25 (25%)
2. Male sex	59 (59%)
3. Geographic location	
Rural	60 (60%)
Urban	40 (40%)

Table 2: Different clinical features of Scrub typhus

Clinical features	% age	Chi square p value
1. Fever	100	
2. Vomiting	56	
3. Abdominal pain	26	
4. Headache	20	
5. Cough	31	
6. Oedema	30	
7. Seizures	08	
8. Respiratory distress	11	0.001
9. Altered sensorium	14	
10. Hepatomegaly	84	
11. Splenomegaly	72	
12. Lymphadenopathy	54	
13. Pallor	44	
14. Eschar	59	

Table 3: Distribution of Eschar

Site of Eschar	Frequency (n=100)
Axilla	22
Groin	20
Behind ear	4
Scrotum	3
Chest	3
Scapula	3
Buttock	2
Perianal	1
Lateral canthus	1

**Fig. 1:** Seasonal pattern of Scrub Typhus

5. Discussion

In our present study, out of total 283 cases of acute febrile illness, 35.5% cases were found to be scrub typhus. The cases of acute undifferentiated fever lasting 5 days or more were considered and the rest identifiable causes of acute fever were excluded from the study. The other causes of acute fever observed in the study were malaria (25.4%), acute respiratory infection (9.1%), sickle cell disease with sepsis (7.7%), typhoid (6.7%), dengue (7.4%),

Acute bacterial meningitis (4.2%) and Leukemia was found (3.8%) of cases. The prevalence of scrub typhus varies from region to region in different studies and has been found to be upto 50 per cent of undifferentiated fever presenting to hospital in a study conducted in South India.⁸ In another study in Odisha showed about 48.7% prevalence among the patients attending OPD with fever for more than 5 days.² Most of the scrub typhus cases were observed among the children of age group 2 to 6yrs, and males were affected more than females with a male to female ratio of 1.4:1. More number of cases were found from rural area in our study, similar findings were also observed by different authors.^{9,10} This might be related to favorable conditions in rural areas related to place, vector and transmission mechanism of the scrub typhus.¹¹ The favourable season for scrub in our study was late rainy and early winter season and maximum number of cases were seen in the month of September. Similar observations were also found by many authors. Probably rainy and winter seasons favors growth of vegetations which helps in increase in vector population and interaction with human host.¹²

Common clinical features present in our study were fever, vomiting, cough, edema, abdominal pain and headache. Altered sensorium and seizures indicating CNS scrub were present in 14% and 8% cases respectively. Respiratory distress was found in 11% cases simulating pneumonia and was present after 5 days of the illness. High grade fever was the dominating complain by the parents in all the cases. Many studies also reveals similar observations.^{9,10} It was observed that edema in the form of periorbital puffiness along with high grade fever more than or equal to 5 days was an important clue to diagnose scrub clinically. 30% of our cases had edema in the form of periorbital puffiness, few cases also had pedal edema and ascites.¹³ Lymphadenopathy was present in 54% cases. In scrub lymphadenopathy can be localised near the draining sites of eschar or it can be generalized. In our study generalized enlargement lymphnodes were more common, other studies also showed similar observation.¹⁴ Few cases presented as respiratory illness with fever, cough (31%) and respiratory distress (11%) clinically mimicking severe pneumonia, the cardiological examination and chest x-ray were normal. The clinical clue to enter into scrub diagnosis was presence of eschar in those cases, who were confirmed to be scrub typhus as IgM ELISA for scrub was positive.

Hepatomegaly and splenomegaly were present in 84% and 72% of the cases respectively. As our zone is an endemic zone for malaria, those type of clinical presentation with fever and hepatosplenomegaly led us to think in the line of malaria. As the investigations for malaria like MP ICT and smear study were negative, scrub was the likely diagnosis and on serological investigations it was confirmed in many cases. Though malaria was also found in 25.4% of cases in our study. The clinical findings of

hepatosplenomegaly with fever has been observed by many authors.¹⁵

The entry point of the agent by *Orientia tsutsugamushi* is the primary cause of initiation of the disease process, which is major clue for diagnosis of scrub as it produces a classical skin lesion in the form of eschar. Eschar is a painless, cigarette burn like ulcerated lesion with or without a black coloured scab. It is usually found in the under garment areas and skin folds. So, extensive search to find out the eschar is an important clinical examination. In our study eschar was found in 59% of cases. It was seen most commonly in axilla (22%) and groin (20%). It was also seen in the areas which are usually inaccessible like perianal, scrotum and behind the ears. Various studies shows variable results of eschar.^{9–12} Most of our cases responded dramatically to the conventional treatment with doxycyclin or azithromycin. The response to treatment in the form of defervescence and generalized well being was observed in 24 - 48 hrs. Few cases who presented with CNS involvement also showed good response in 48 hrs.

6. Conclusion

The prevalence of scrub typhus was 35.5% among children with acute undifferentiated fever lasting five days or more. There was a seasonal pattern with a post monsoon and early winter surge. The implication of this study is that preventing contact with domestic animals during the predisposing period may lead to control of the emerging disease. However, since it is a hospital based study further research is required to prove this hypothesis.

7. Sources of Funding

No financial support was received for the work within this manuscript.

8. Conflicts of Interest

No conflicts of interest.

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Author biography

Budhia Majhi, Associate Professor

B Maheswar Rao, Assistant Professor

Saroj Sekhar Rath, Assistant Professor

Saroj Ku. Barma, Assistant Professor

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