CLINICAL AND EPIDEMIOLOGICAL PROFILE OF SCRUB TYPHUS IN PAEDIATRIC PATIENTS: A TERTIARY CARE HOSPITAL STUDY IN SOUTHERN INDIA

D. Ramaganeshan¹, P. Ramu², B.V.L. Narasimha Rao³, N. Chaitanya⁴

¹Associate Professor, Department of Paediatrics, King George Hospital, Andhra Medical College, Visakhapatnam.

²Assistant Professor, Department of Paediatrics, King George Hospital, Andhra Medical College, Visakhapatnam.

³Junior Resident, Department of Paediatrics, King George Hospital, Andhra Medical College, Visakhapatnam.

⁴Junior Resident, Department of Paediatrics, King George Hospital, Andhra Medical College, Visakhapatnam.

ABSTRACT

BACKGROUND

Scrub typhus is an important cause of acute febrile illness caused by *Orientia tsutsugamushi* with uncertain pathogenesis, but presents as a systemic vasculitis like infection resulting in wide range of clinical manifestations and complications. Though it is endemic in many parts of India, Scrub typhus is grossly underdiagnosed partly because of lack of awareness among clinicians and partly due to poor availability of standardized diagnostic tests in tropical areas. We studied the clinical and epidemiological profile of paediatric scrub typhus patients.

AIM

The study was done with the aim of determining clinical and epidemiological profile of paediatric scrub typhus patients.

MATERIAL AND METHODS

This study was conducted at King George Hospital, Visakhapatnam, Andhra Pradesh, a Tertiary Care Teaching Hospital between June 2013 and November 2015. All paediatric patients of an acute febrile illness turned to be positive for one-step scrub typhus antibody test are included in the study.

RESULTS

The present study includes 93 children less than 12 years' age group, who were tested positive for scrub typhus antibody and shown highest incidence in 6-10 years' age group (58 cases; 62.37%); slight male preponderance and more number of cases reported from Srikakulam district. Majority of cases were reported between September and October months.

CONCLUSION

Scrub typhus is an important cause of acute febrile illness caused by *Orientia tsutsugamushi* with uncertain pathogenesis. Though it is endemic in many parts of India, Scrub typhus is grossly underdiagnosed partly because of lack of awareness among clinicians and partly due to poor availability of standardized diagnostic tests in tropical areas. The present study has proved that Scrub typhus is endemic in our area and the true incidence of Scrub typhus may be much higher. Hence, the clinicians should be aware of endemicity, clinical presentations, the variety of complications, recommended investigations and treatment for paediatric scrub typhus patients.

KEYWORDS

Scrub Typhus, Eschar, *Orientia Tsutsugamushi*, Paediatric Patients, SD BIOLINE *Tsutsugamushi* Test.

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INTRODUCTION

Rickettsia comprise a group of microorganisms that phylogenetically occupy a position between bacteria and viruses. Among the rickettsial infections, there are increasing number of recent reports of scrub typhus in various parts of India. Scrub typhus is caused by *O. tsutsugamushi* through the bite of trombiculid mite. Scrub typhus is zoonotic disease where man is an accidental host and the disease is transmitted by bite of larval mites (Chiggers) *Leptotrombidium deliense*.

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Corresponding Author:

Dr. P. Ramu,

Raja Sagi Residency, FF-3,

Door No.: 14-1-122/13,

Nowroji Road, Maharanipeta,

Visakhapatnam-530002,

Andhra Pradesh.

E-mail: drpramu73@gmail.com

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In India, scrub typhus infections are reported from Maharashtra, Tamilnadu, Karnataka, Jammu and Kashmir, Uttaranchal, Himachal Pradesh, Rajasthan and West Bengal. Scrub typhus has been increasingly reported from almost all parts of country in recent years. In fact some recent reports from several parts of India indicate that there is a resurgence of Scrub typhus, but the disease remains grossly underdiagnosed due to the lack of awareness among clinicians regarding the endemicity of the disease and also the laboratory investigations are not widely available. Hence, we studied the clinical and epidemiological profile of Scrub typhus in paediatric patients in our area.

MATERIAL AND METHODS

This cross-sectional study was conducted in the Department of Paediatrics, King George Hospital, Visakhapatnam, a tertiary care teaching hospital between June 2013 and November 2015. A total of 93 children <12 years' age group who turned positive for One-Step Scrub typhus antibody test, while

investigating for acute febrile illness were included in the study. Patients who were positive for other infective causes (Malaria, dengue) are excluded from our study.

RESULTS

In our study, the commonest age group of paediatric Scrub typhus was 6-10 years (58 patients, 62.3.7%) followed by 1-5 years' age group (19 patients, 20.43%). Only one patient of 11 months age had Scrub typhus in our study (Table 1). Our study has shown slight male preponderance (54.84%, 51 patients, Table 2). Patients from nearby Srikakulam district occupied the major share of our study (48 patients, 51.61%) followed by Vizianagaram and Visakhapatnam districts (Table 3). All cases are from rural areas.

In the present study, majority of the cases were reported during September and October months (Table 4). Among the presenting complaints, fever, tachypnoea, abdominal pain, facial puffiness and rash dominated the clinical picture (100%, 30.10%, 25.80%, 23.65%, 23.65% respectively - Table 5). Among the examination findings fever, rash, generalized lymphadenopathy, hepatosplenomegaly, eschar and generalized oedema have dominated the clinical picture in our study. In our study majority of our patients presented to us in the second week of illness with one or more of the complications mentioned in the Table 7 after having been treated in the periphery in view of common acute febrile illnesses like malaria, typhoid, dengue. Among the complications, our study population had hepatic dysfunction in the form of elevated liver aminotransferases with or without jaundice (40 cases; 43.01%), pneumonia (18 cases; 19.35%), renal impairment (12 cases; 12.9%) which accounted for majority. Other complications such as meningoencephalitis, severe anaemia, shock, ARDS and multi-organ dysfunction were observed in rest of patients.

Age Group (In Years)	No. of Cases	%
<1 Year	1	1.07
1-5	19	20.43
6-10	58	62.37
10-12	15	16.13

Table 1: Age Wise Distribution of Patients (Present Study n=93)

Sex	No. of Cases	%
Males	51	54.84
Females	42	45.16

Table 2: Gender Wise Distribution (Present Study n=93)

District	No. of Cases	%
Srikakulam	48	51.61
Vizianagaram	33	35.49
Visakhapatnam	12	12.90

Table 3: Demographic Areas (Present Study n=93)

Month	No. of Cases	%
June	2	2.15
July	3	3.23
August	5	5.38
September	41	44.08
October	30	32.26
November	12	12.90

Table 4: Month Wise Distribution (Present Study n=93)

Complaint	No. of Cases	%
Fever	93	100
Rash	22	23.65
Abdominal Pain	24	25.80
Body aches	4	4.30
Black stools	4	4.30
Abnormal Body Movements	2	2.15
Headache	12	12.90
Facial Puffiness	22	23.65
Neck Swellings	4	4.30
Altered Sensorium	3	3.22
Vomiting	12	12.90
Fast Breathing	28	30.10
Swelling Feet	8	8.60
Cough	12	12.90
Chest Pain	4	4.30
Pallor	4	4.30

Table 5: Presenting Complaints (Present Study n=93)

Examination Finding	No. of Cases	%
Fever	93	100
Generalised Rash	22	23.65
Generalised Lymphadenopathy	44	47.31
Conjunctival Congestion	28	30.10
Hepatosplenomegaly	38	40.86
Jaundice	21	22.58
Hepatomegaly	16	17.20
Generalised Oedema	22	23.65
Eschar	72	77.41
Splenomegaly	9	9.67
Meningeal Involvement	8	8.60
Crackles/Rhonchi	18	19.35
Gastrointestinal bleeding	4	4.30
Congestive cardiac failure	3	4.30

Table 6: Distribution of Study Group According to Examination Findings (Present Study n=93)

Complications	No. of Cases	%
Hepatic Dysfunction	40	43.01
Renal Dysfunction	12	12.9
Meningoencephalitis	8	8.60
Gastrointestinal Bleeding	4	4.30
Severe Anaemia	8	8.60
Shock	3	3.23
Myocarditis	3	3.23
Bronchopneumonia	18	19.35
Multi-Organ Involvement	4	4.30
Pericardial Effusion	1	1.07
ARDS	2	2.15

Table 7: Complications (Present Study n=93)

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

DISCUSSION

Of the diseases caused by Rickettsiae in man, the most widespread is Scrub typhus. It exists as a zoonosis in nature between certain species of trombiculid mites and their small mammals (e.g.: field mice, rats, shrews). Scrub typhus is endemic in Northern Japan, South East Asia, the Western Pacific islands, Eastern Australia, China, Maritime areas and several parts of South Central Russia, India and Sri Lanka.¹ More than 1 million cases occur annually. Most travel acquired cases of Scrub typhus occur during visits to rural areas in endemic countries for activities such as camping, hiking or rafting, but urban cases have also been described.² Active rice fields are reservoirs for transmission.

The natural reservoir of infection is the adult mite from which the organism passes to larva by transovarian transmission. All age groups are at risk for Scrub typhus. Infection can occur throughout the year. Incubation period is generally 4-21 days. Rash with oedema, presence of eschar is a valuable clue for diagnosis. Rash in Scrub typhus is encountered in 30% of children only. Eschar is found in the skin folds of axilla, inguinal region, scrotal folds or along the line of inner garments. One needs to strip the patient and meticulously look for eschar inside the skin folds, which can be between 0.5-20 mm, covered by a black scab, on healing leaves a raised red margin. Presence of eschar may vary 7-70%. Complications include pneumonia in 20-35%, meningoencephalitis in 10%, acute myocarditis, renal failure, septic shock like syndrome and can be fatal if untreated. Differentiating from the common febrile illnesses like complicated malaria, leptospirosis and dengue fever is difficult in the first week of illness.

Clinical presentation of Scrub typhus can be similar to dengue, but the haemodynamic compromise in the form of capillary leak leading to shock is more common in dengue than Scrub typhus. Delayed recognition and failure to recognize are the common reasons for mortality in Scrub typhus. Case fatality in untreated children can be as high as 30%.³ The pyrexia falls by lysis in 3rd week in untreated cases. Non-microscopic Rapid Diagnostic Tests are now available and should more *O. tsutsugamushi* infection be diagnosed. Currently Indirect Immunofluorescence Antibody (IFA) test, which is highly sensitive and specific is in routine use.

However, the test requires fluorescence microscopes, trained personnel and cell culture procedures for preparing Rickettsial antigens.⁴ The SD BIOLINE *tsutsugamushi* test (One-Step Scrub typhus antibody test) was evaluated for its sensitivity and specificity relative to those of IFA test and showed an attractive for the diagnosis of Scrub typhus. It was developed using major surface protein 56-KDa antigen of representative *O. tsutsugamushi*.⁵ Scrub typhus can be partly prevented or controlled by wearing protective clothing by treatment of clothing with repellents or acaricides, application of DEET etc. to the exposed areas of skin when walking in terrain of endemic areas.⁶ Immunity to Scrub typhus following overt disease is remarkably short lived lasting only a few months and is highly strain specific, so that heterologous protection is insufficient to protect from infection to different strains. Scrub typhus remains easily treatable, though to date no sufficiently protective vaccine has been developed.⁷

The recommended treatment regimen for Scrub typhus is doxycycline (4 mg/kg/day PO or IV divided every 12 hrs.; maximum: 200 mg/day). Alternative regimens include tetracycline (25-50 mg/kg/day PO divided every 6 hrs.; maximum: 2 g/day) or chloramphenicol (50-100 mg/kg/day

divided every 6 hrs. IV; maximum: 4 g/24 hrs.). If used, chloramphenicol should be monitored to maintain serum concentrations of 10-30 µg/mL. Therapy should be continued for a minimum of 5 days and until the patient has been afebrile for at least 3 days to avoid relapse. The present study includes 93 children less than 12 years' age group who were tested positive for Scrub typhus antibody and shown highest incidence in 6-10 years' age group (58 cases; 62.37%); slight male preponderance and more number of cases reported from Srikakulam district. Majority of cases were reported between September and October months. Almost all cases reported from rural areas in the second week of illness and most of them found to have one or more of the described complications. Most of the clinical manifestations like fever, eschar, lymphadenopathy, pneumonia, maculopapular rash, splenomegaly, etc. had good clinical correlation with the previous studies done by Jim WT et al⁸, Huang et al⁹, Sirisantan V et al¹⁰ and Chanta et al.¹¹

CONCLUSION

Scrub typhus is an important cause of acute febrile illness caused by *Orientia tsutsugamushi* with uncertain pathogenesis, but presents as a systemic vasculitis like infection resulting in wide range of clinical manifestations and complications. Though it is endemic in many parts of India, Scrub typhus is grossly underdiagnosed partly because of lack of awareness among clinicians and partly due to poor availability of standardized diagnostic tests in tropical areas.^{12,13} It needs high index of suspicion in all cases of acute febrile illness by the treating clinicians and a thorough search for the presence of eschar as well as recognition of the compatible clinical features in the patients should be made. Prompt institution of appropriate antibiotics, which results in a dramatic response can prevent serious and often life-threatening complications. The present study has proved that Scrub typhus is endemic in our area and the true incidence of Scrub typhus may be much higher, because ours is a referral hospital and usually we do get complicated cases and many uncomplicated, subclinical cases may go undetected. Hence, the clinicians should be aware of endemicity, clinical presentations, the variety of complications, recommended investigations and treatment for paediatric Scrub typhus patients.

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