

Original research paper

A study on the clinical profile of children aged less than 12 years with rickettsial infections

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Abstract

Rickettsial diseases are one of the most re-emerging infections of the present time. They are generally incapacitating and difficult to diagnose. Untreated cases can have fatality rates as high as 30-35% but when diagnosed properly, they are often easily treatable. It is a time bound prospective hospital based observational study and All children aged less than 12 years admitted in paediatric ward with fever without an identifiable source of infection and one or more of the following clinical features: rash, oedema, hepatosplenomegaly, Lymphadenopathy, an Eschar and a tick bite or tick exposure were suspected to have rickettsial infection. The most common age group of presentation was between 1 and 5 yrs. The common symptoms in these children included fever (100%), rash 79.4%), edema of limbs (32.4%), puffiness of face (29.4%), generalised edema (20.6%), cough (20.6%), pain abdomen (14.7%), vomiting (11.8%), convulsions (8.8%), headache (2.9%) and arthralgia (2.9%). Signs like Hepatomegaly, facial puffiness, pedal edema, splenomegaly, ecchymosis present in 53.3%, 41.1%, 38.2%, 8.8% and 5.8% of the cases respectively, mimicking common illnesses. Thus warrants high index of suspicion. There is emergence of rickettsial disease in this part of north Karnataka which might have been overlooked earlier due to low index of suspicion.

Keywords: Rickettsial infection, ELISA, children

Introduction

Rickettsial diseases are emerging and reemerging diseases and are increasingly recognized in India ^[1]. Rickettsial diseases have been documented in India since 1930 with reports of scrub typhus from Kumaon region, Assam in soldiers during the Second World War, Scrub and murine typhus from Jabalpur area in Madhya Pradesh and of murine typhus from Kashmir. Rickettsiosis, of which scrub is the commonest, is reported from several states in India including Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Bihar, West Bengal, Meghalaya, Rajasthan, Maharashtra, Karnataka, Tamil Nadu and Kerala. In some regions scrub typhus accounts for up to 50% of undifferentiated fever presenting to hospital. Once

thought to be diseases of rural population, these infections are increasingly reported from urban areas of India [2].

Most common rickettsial infections occurring in India is Scrub Typhus which is caused by *Orientia Tsutsugamushi*. The infection is transmitted through the larval mites or “chiggers” belonging to the family Trombiculidae. The vector mite is known to be present in diverse ecological niches such as equatorial rain forests, semi deserts and Alpine subarctic terrains in the Himalayan regions. Endemic foci are usually associated with specific habitats such as abandoned plantations, gardens or rice fields, overgrown forest clearings, shrubby fringes of fields and forests, river banks and grassy fields. These ecological patches which attract the natural host of mite vectors are called “mite islands”. Incidence of scrub typhus is higher among rural populations. The disease is seasonal in many parts of India, which correlates with the appearance and activity of mites [3, 4].

In India, endemic typhus has been reported from Pune, Lucknow, Mysore, Kolkata, Golkunda, Kamal, Rewari and Kashmir.

Indian tick typhus was first observed in India in the foothills of the Himalayas. Subsequently, the disease was reported from many parts of the country namely Allahabad, Narsapatnam, Ratlam, Secunderabad, Trichinapally, Bangalore, Jhansi, Darjeeling, Pune and Lucknow. The tick species *Rhipicephalus sanguineus* is the most important vector and is generally found infesting dogs all over. An extensive study on tick borne rickettsiosis in Pune district of Maharashtra showed that Indian tick typhus exists as zoonosis [5].

Batra *et al.* has reported high magnitude of scrub typhus, spotted fever, Indian tick typhus in subcontinent.

In India, the reported numbers are an underestimate due to lack of community based data and non-availability of confirmatory laboratory tests [6].

Family Rickettsiaceae comprise a group of microorganisms that phylogenetically occupy a position between bacteria and viruses. Rickettsiae are small, non-flagellate, gram negative pleomorphic cocco-bacilli adapted to obligate intracellular parasitism and transmitted by arthropod vectors. They are primary parasites of arthropods like lice, fleas, ticks and mites, in which they are found in the alimentary canal. In vertebrates, including humans, they infect vascular endothelium and reticulo-endothelial cells. Family Rickettsiaceae comprises three genera namely *Rickettsia*, *Orientia* and *Ehrlichia*. Former members of this family, *Coxiella burnetii* which causes Q fever and *Rochalimaea Quintana* causing trench fever have been excluded because the former is not primarily arthropod-borne and the latter not an obligate intracellular parasite. Being obligate intracellular parasites, these organisms do not grow on cell free media and need tissue cultures and laboratory animals for their isolation [7, 8].

Methodology

Source of data

All children less than 12 years of age with clinical features of Rickettsial infection and serology positive for Rickettsial IgM/IgG ELISA admitted to Paediatric ward.

Study design: Prospective time bound observational study.

Inclusion criteria

- All children up to 12 years of age will be considered.
- All children aged less than 12 years admitted in pediatric ward with fever without an identifiable source of infection and one or more of the following clinical features: rash, edema, hepatosplenomegaly, lymphadenopathy, an eschar and a tick bite or tick exposure were suspected to have rickettsial infection along with positive serology test for

Rickettsial IgM/IgG ELISA.

Exclusion criteria: Cases with other established causes of infection

Method of study

All children aged less than 12 years admitted in pediatric ward with fever without an identifiable source of infection and one or more of the following clinical features: rash, edema, hepatosplenomegaly, lymphadenopathy, an eschar and a tick bite or tick exposure were suspected to have rickettsial infection. The purpose of the study was explained to the parents or guardians of the child and an informed consent was taken from them enrolling the child in study group. All suspected cases were subjected to rickettsial IgM/IgG ELISA test and tests to exclude malaria-thick and thin peripheral smear, WIDAL for enteric fever and NS 1 and IgM Mac ELISA for dengue fever. Patients were treated according to the hospital protocol. All rickettsial IgM/IgG positive cases were followed up through hospital stay and outcomes were noted. The ELISA kit used in this study was Scrub typhus IgM/IgG from INBIOS international from USA and Rickettsia Conorii ELISA IgM/IgG VIRCELL from Spain.

Chest X-rays, tests for renal and liver function, serum electrolyte, ultrasonography (USG), neuroimaging, cerebrospinal fluid analysis (CSF) were done as and when required.

Results

Table 1: Gender distribution (n=34)

Gender	No. of Patients	Percentage (%)
Male	16	47
Female	18	53
Total	34	100

Out of 34 children diagnosed with rickettsial disease, 47% (16) were boys and 53% (18) were girls.

Table 2: Age group wise distribution of cases (n=34)

Age in years	No. of Patients	Percentage (%)
<1 year	2	5.9
1-5 years	17	50
6-10 years	10	29.4
11-12 years	5	14.7
Total	34	100.0

Most common age group of occurrence of rickettsial infection was between 1 to 5 years (50%) followed by the age group of 6 to 10 years with 10 cases (29.4%).

Mean age of rickettsial infection in the study was 5.4 ± 3.5 years.

Table 3: Month wise distribution of cases (n=34)

Month	No. of Patients	Percentage (%)
January	1	2.9
February	1	2.9
March	1	2.9
May	2	5.8
June	2	5.8

July	4	11.8
August	7	20.6
September	5	14.7
October	3	8.8
November	4	11.8
December	4	11.8

More cases presented during second half of the year. Maximum number of cases were in the month of August (n=7, 20.6%), followed by September (n=5, 14.7%).

Table 4: Clinical symptoms (n=34)

Symptoms		No. of patients (n=34)	%
Fever		34	100
Duration of fever	Duration < 5 days	2	5.9
	5-7 days	20	58.8
	8-10 days	12	35.3
Rash	Generalized rash	27	79.4
	Rash with involvement of palms and soles	17/27	50
Edema of legs		11	32.4
Facial puffiness		10	29.4
Generalized edema		7	20.6
Cough		7	20.6
Pain abdomen		5	14.7
Vomiting		4	11.8
Convulsion/ Seizures		3	8.8
Contact with pets or exposure to animals		12	35.2
Headache		1	2.9
Arthralgia		1	2.9

Fever was present in all cases (n=34, 100%). Duration of fever ranged from 2 days to 10 days, of which 2 cases (5.9%) presented within 4 days of illness.

58.8% (n=20) presented in the second half of first week. 35.3% (n=12) presented in the first half of second week. Mean duration of fever was 5.7 ± 2.1 days.

Rash was seen in 79.4% (n=27) of cases. Out of those 27 cases 17 had involvement of palms and soles (50%). The other common presentation was symptoms were periorbital puffiness in 29.4% (n=10), edema of legs in 32.4% (n=11), generalized edema in 20.6% (n=7).

Contact with pets or animal exposure: was seen in 12(35.2%) cases.

Table 5: Clinical signs (n=34)

		No. of patients (n=34)	%
Rashes	Macular	28	5
	Maculopapular		13
	Petechiae		10
Hepatomegaly		16	53.3
Facial Puffiness		14	41.1
Pedal Edema		13	38.2
Conjunctival congestion		9	26.4
Pallor		7	20.6
Ascites		5	14.7
Generalized Edema		4	11.7

Hepatosplenomegaly	3	8.82
Ecchymosis	2	5.89

Out of 34 cases, rash was present in 28 cases (82.3%). 53.3% (n=16) cases presented with hepatomegaly. Facial Puffiness was present in 41.1% (n=14).

38.2% (n=13) cases were present with pedal Edema and 29.4% (n=10) cases were present with petechiae. Conjunctival congestion was present in 26.4% (n=9) of children and pallor in 20.6% (n=7). Signs of ascites were present in 5 children (14.7%). Generalized Edema was present in 11.7% (n=4) of children. Hepatosplenomegaly was seen in 8.82% (n=3). Signs of Ecchymosis were present in 2 children (5.89%).

Discussion

The mean age of occurrence of rickettsial infection in present study was 5.4 years with maximum incidence in the age group of 1 to 5 yrs (50%). Similar observations of age predilection for less than 5 years was made by Patil D *et al.*,^[6] and Krishna MR *et al.*^[10]

In this study females (53%) outnumbered males, with male to female ratio of 0.9:1 (16:18). This differs from the studies by other authors like Kumar M *et al.*, Krishna MR *et al.*^[10] and Reddy BK *et al.* who reported male preponderance. However as per Digra SK *et al.* there was no such gender preponderance.

In this study, patients were from neighbouring places of Hubli like Kundagol (n=10), Kalghatagi (4), Shiggaon (3) and from Rural Hubli (9), suggesting endemicity of the disease.

The majority of the cases were observed during second half of the year, from July to December around 79.5%. Similar observations have been recorded by Krishna MR *et al.*^[10] (June to November), by Digra SK *et al.*^[11] (August to November) and Palanivel S *et al.*^[12] This might be associated with increased activity of mite or ticks during cooler months. Further, in the immediate post monsoon period (September to early months of the next year), there is growth of secondary scrub vegetation, which is the habitat for trombiculid mites (mite islands).

In this study all the cases were from rural areas and most of them belonged to lower socioeconomic status. This might be attributable to more chances of over-crowding, poor hygiene, tick infestation and louse infestation in these patients.

In the present study all patients presented with fever (100%), similar finding was noted in other studies. Approximately 65% (n=17) of the patients presented with 5-7 days of acute febrile illness with no foci of infection. Rash was seen in 79% of which 50% (n=17/27) had involvement of palms and soles. Facial puffiness was seen in 29.4%, swelling of limbs seen in 32.4% and generalized edema in 20.6%.

Other symptoms included cough (20.6%), Pain abdomen (14.7%), Vomiting (11.8%), Convulsions (8.8%), arthralgia and headache (2.9%).

These varied presentations warrants high index of suspicion for early diagnosis of rickettsial disease which mimic common illness.

A history of tick/mite bite was not available in any of the cases. Similar findings have been reported by Krishna MR *et al.*^[10] and attributed to the small size of the mite or louse and the fact that the bite does not cause pain or pruritis.

In the present study 53.3% cases presented with hepatomegaly. Mahajan SK *et al.*,^[13] Kumar S *et al.*,^[14] Huang CT *et al.*^[15] reported hepatomegaly in 43%, 29% and 36% of patients respectively. However Krishna MR *et al.*,^[10] Kumar M *et al.*,^[16] Digra SK *et al.*^[11] noted hepatomegaly in 94%, 91% and 76% respectively.

Facial Puffiness and pedal edema were noted in 41.1% and 38.2% cases in the present study. Digra SK *et al.*^[11] study reported facial puffiness and pedal edema in 28.5% and 14.3% patients, while Palanivel S *et al.*^[12] reported in 74.6% and 77.6% of patients respectively. Ascites was present in 5 children (14.7%) in our study. Kumar M *et al.*^[16] and Kumar S *et al.*

^[19] study reported ascites in 11% and 5.2% of patients respectively. Generalized Edema was present in 11.7% of children. Digra SK *et al.* ^[11] study showed generalized edema in 14.3% of patients.

Conjunctival congestion was present in 26.4% of children. Digra SK *et al.*, ^[11] Mahajan SK *et al.* ^[13] study showed Conjunctival congestion in 47.6%, 33.3% of patients.

Our study showed splenomegaly in 8.82% (n=3). Kumar S *et al.* ^[19] and Mahajan SK *et al.* ^[13] reported splenomegaly in 27.8% and 33.3% cases respectively.

Ecchymosis was present in 2 children (5.89%). Palanivel S *et al.* ^[12] reported ecchymosis in 14.9% of patients.

None of the cases in the present study had eschar unlike other studies. 16 Mahajan SK *et al.* ^[13] did not find eschar in any of their cases. Though presence of eschar confirms and is pathognomonic of scrub typhus group of rickettsial diseases, but its absence does not exclude the possibility of scrub typhus.

Conclusion

Rickettsial diseases are one of the important causes of pyrexia of unknown origin, which are grossly under diagnosed in India. There is emergence of rickettsial disease in this part of north Karnataka which might have been overlooked earlier due to low index of suspicion.

It is most commonly seen in younger age group. Children presenting with fever, rash and edema of legs or facial puffiness should be suspected of rickettsial fever. Hepatosplenomegaly, rash and third space fluid loss are the most common clinical signs noted.

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