



CLINICAL AND LABORATORY PROFILE OF PEDIATRIC SCRUB TYPHUS AT A TERTIARY CARE TEACHING HOSPITAL IN SOUTHERN RAJASTHAN

Paediatric Medicine

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ABSTRACT

Background: Scrub Typhus is an important cause of acute febrile illness that is caused by *Orientia tsutsugamushi*. It is transmitted by bite of larval stage (chigger) of a trombiculid mite. Scrub typhus is a zoonosis.

Material and methods: This was a hospital based prospective study conducted in Department of Paediatrics, Balchikitsalaya, MB Govt. Hospital, RNT Medical College, Udaipur, Rajasthan over a period of 21 months from October 2019 to June 2021. All children aged 1 month to 18 years admitted with fever with serologically confirmed Scrub Typhus test (Positive IgM ELISA) were included in the study. A detailed history was recorded, Clinical examination, anthropometric measurement, laboratory findings, complications, and outcome of patients were recorded on a prestructured proforma.

Results: During study period 152 children had scrub typhus and fulfilling inclusion criteria were included in the study. All children presented with fever. Other common symptoms were vomiting (65.78%), headache (42.10%), abdominal pain (37.50%), bodyache (25%), altered sensorium (22.36%) and cough (21.71%). Most common examination finding was fever in all the children, pallor (74.34%), oedema (50%), tachypnea (43.42%), hypotension (38.81%), rash (32.89%), hepatomegaly (29.60%), facial puffiness (28.94%) and Eschar (7.89%) were other common findings. Doxycycline, azithromycin or chloramphenicol were used for treatment.

Conclusion: Scrub Typhus is one of the common causes of acute febrile illness in children. A high degree of suspicion, a search for an eschar and knowledge of geographical distribution of rickettsial diseases is crucial for its early diagnosis, treatment and favourable outcome.

KEYWORDS

Scrub Typhus, *Orientia tsutsugamushi*, eschar, Mite, Zoonosis

INTRODUCTION

Scrub Typhus is an important cause of acute febrile illness that is caused by *Orientia tsutsugamushi*. It is transmitted by bite of larval stage (chigger) of a trombiculid mite (*Leptotrombidium*), which serves as both vector and reservoir.¹ Scrub typhus is a zoonosis and human are accidental hosts².

More than 1 million infections occur each year, and it is estimated that more than 1 billion people are at risk. Scrub typhus occurs mostly in Asia, including areas delimited by Korea, Pakistan, and northern Australia¹. Scrub typhus has become the most commonly reported Rickettsial infection in Indian subcontinent³. In India Rickettsial infections have been documented from the state of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Rajasthan, Assam, West Bengal, Maharashtra, Kerala, and Tamilnadu⁴. In the past few years, the number of cases of scrub typhus in India has increased, especially during late rainy and post rainy season of the year.³

The clinical presentation of scrub typhus ranges from a mild, non-specific febrile illness to a life-threatening fatal condition and can affect almost every organ system⁵. Serious complications of scrub typhus are not uncommon and may be fatal; they include pneumonia, meningoencephalitis, shock, acute renal failure and gastrointestinal bleeding. Early diagnosis is important because there is usually an excellent response to treatment and timely antimicrobial therapy may help to prevent complications⁶.

Scrub typhus is grossly under-diagnosed in India due to its non-specific clinical presentation, low index of suspicion among clinicians, limited awareness about the disease and lack of diagnostic facilities. They may mimic tropical febrile illnesses such as malaria, dengue fever, typhoid fever and leptospirosis⁵.

There are few studies on scrub typhus in children. No study has been published on the problem of scrub typhus in children from this part of Rajasthan. Hence the present study conducted in department of pediatrics, RNT Medical College and MB Govt. Hospital, Udaipur (Rajasthan).

MATERIAL AND METHOD:

The study was a hospital based prospective study, carried out in Department of Paediatrics, Balchikitsalaya, MB Govt. Hospital, RNT Medical College, Udaipur, (Rajasthan) over a period of 21 months from October 2019 to June 2021. Prior approval from Institutional Ethics Committee was obtained. All children aged 1 month to 18 years admitted with fever with serologically confirmed Scrub Typhus test (Positive IgM ELISA) were included in the study. Only those children were included, where the parents have given informed consent. A detailed history was recorded, Clinical examination, anthropometric measurement, laboratory findings were recorded on a prestructured proforma. Data regarding age, sex, residence, socioeconomic status (modified Kuppuswamy scale 2020) and history of animals in house was also collected. Complete blood count, liver and renal function test, urinalysis, serum electrolyte estimation, Random Blood Sugar, chest X-ray, Peripheral smear and rapid antigen test for Malaria, Dengue serology (NS1 Antigen and IgM antibody), Widal and IgM typhidot test for enteric fever, Covid-RTPCR for Covid-19 infection and blood culture was done to rule out other infective condition. Cerebrospinal fluid (CSF) analysis was performed for selected cases with suspected meningoencephalitis. ABG, CPK MB and Neuroimaging was done whenever required. All patients serologically confirmed as Scrub Typhus were treated with 10 days of antibiotics (Doxycycline-4mg/kg/day, or Azithromycin-10 mg/kg/day, or Chloramphenicol-100mg/kg/day).

RESULTS

A total of 152 children were enrolled in the study. There were 83 (54.60%) females and 69 (45.39%) males in the present study, with male:female ratio of 0.83:1. There is female predominance in the present study. Majority of children 66 (43.42%) were in the age group of 11 to 15 years. Only one child was below 1 year of age. 150 (98.68%) children belong to rural area and only 2 (1.3%) from urban area (table-1). Domestic animals were present among 146 (96.05%) of households of study population. 133 (87.50%) cases were reported during month of August to November (Rainy and post rainy season). There were only few cases during summer (March-June 2020 five patients and March-June 2021 three patients) and winter season (December 2019-February 2020

two patients and December2020-February 2021 five patients). All children had fever at presentation, 113(74.34%) had fever of 5 to 9 days of duration ,146(96.05%)had intermittent type and in 6(3.95%) cases it was continuous type and in 132(86.84%) children fever was associated with chills and rigors .Other common symptoms were, vomiting in (65.78%),headache(42.10%), abdominal pain (37.50%), bodyache (25%),altered sensorium (22.36%), cough (21.71%), breathlessness (19.07%),rash (12.5%),loose motion 16 (10.52%), swelling over body (7.89%), and seizures (3.94%). Most common examination finding was fever recorded in all the children and (96.71%) had moderate to high grade fever(>101°F), other common signs were pallor (74.34%) , oedema(50%), tachypnea (43.42%), hypotension(38.81%) ,rash(32.89%), hepatomegaly (29.60%), facial puffiness (28.94%), hepatosplenomegaly(24.34%), altered sensorium (22.36%), conjunctival congestion (21.05%), lymphadenopathy (regional) (17.76%), bleeding (13.15%), neck rigidity (10.52%), icterus 15(9.86%) and splenomegaly in 10 (6.57%) and Eschar which is pathognomonic for scrub typhus is seen in (7.89%) children only(table-2). Anemia observed (table-3) (hemoglobin <11 gm/dL) in 78.95% , thrombocytopenia (<1,50,000/mm³) in (76.31%) children (table-4) and (62.50%) had leucocyte count in normal range . Leucocytosis (>11000/mm³) was observed in (24.34%) and Leucopenia (<4000/mm³) in (13.16%) children(table-4). Hyponatremia seen in (71.05%), none had severe hyponatremia (<120) and 2(1.32%) children had hypernatremia (table-3). Hypokalemia in 10(6.58%) cases and hyperkalemia seen in 5(3.28%) cases. children 49(32.23%) had elevated serum urea (>45 mg/dL). And (16.44%) children had elevated creatinine level >1.3mg/dL. And (96.71%) children had elevated SGOT(>37U/dL), and (59.86%) case had elevated SGPT(>65IU/dL).(50%) children had hypoproteinaemia total serum protein<6gm/dL and hypoalbuminemia (albumin<3.5 gm/dL) observed in 144(94.73%) children and 70 (46.05%) children had albumin level<2.5 gm/dL(table-5).

Table 1: Demographic data of study population(n=152)

Characteristics	Number(%)
Gender Male	69(45.39%)
Female	83(54.60%)
Age (years)	
<1 year	1
1-5yr	27(17.76%)
6-10	39(25.65%)
11-15yr	66(43.42%)
>15yr	19(12.50%)
Residence	
Rural	150(98.68%)
Urban	2(1.3%)

Table-2-symptom and signs in study population

Symptom	Number(%)	Signs	Number (%)
FEVER	152(100)	FEVER	152(100)
VOMITING	100(65.78)	PALLOR	113(74.34)
HEADACHE	64(42.10)	OEDEMA	76(50)
ABDOMINAL PAIN	57(37.50)	TACHYPNEA	66(43.42)
BODY ACHE	38(25)	HYPOTENSION	59(38.81)
ALTERED SENSORIUM	34(22.36)	RASH	50(32.89)
COUGH	33(21.71)	HEPATOMEGALY	45(29.60)
BREATHLESSNESS	29(19.07)	FACIAL PUFFINESS	44(28.94)
RASH	19(12.5)	HEPATOSPLENO MEGALY	37(24.34)
LOOSE MOTION	16(10.52)	ALTERED SENSORIUM	34(22.36)
SWELLING OVER BODY	12(7.89)	CONJUNCTIVAL CONGESTION	32(21.05)
Seizure	6(3.94)	Lymphadenopathy (regional)	27(17.76)
Eschar	5(3.2)	Bleeding	20(13.15)
Oliguria	3(1.97)	Neck rigidity	16(10.52)
Abdominal distension	1(0.66)	Eschar	12(7.89)
Difficulty in walking	1(0.66)	Splenomegaly	10(6.57)

Table-3: Hemoglobin and serum sodium level in study population

Hemoglobin (gm/dL)	Number (%)	SODIUM(mEq/L)	Number (%)
<7	10(6.58%)	<120	0

7.1-9.0	52(34.21%)	<135	108(71.05%)
9.1-11	58(38.16%)	135-145	42(27.63%)
>11	32(21.05%)	>145	2(1.32%)

Table-4: WBC Count and Platelet count in study population

WBC COUNT	Number (%)	PLATELET COUNT	Number(%)
>11000/mm ³	37(24.34)	1,50,000-4,00,000/mm ³	36(23.68)
4000-11000/mm ³	95(62.5)	1,00,000-1,50,000/mm ³	24(15.78)
<4000/mm ³	20(13.15)	50,000-1,00,000/mm ³	38(25)
		<50,000/mm ³	54(35.52)

Table-5: Transaminases and Albumin level in study population

SGOT (U/dL)	Number(%)	SGPT (U/dL)	Number (%)	Albumin (gm/dL)	Number (%)
<37U/dL	5(3.28)	<65	61(40.13)	3.5-5.5	8(5.26)
38-147	81(53.28)	66-259	84(55.26)	3.5-2.5	74(48.68)
>147	66(43.42)	>259	7(4.60)	<2.5	70(46.05)

DISCUSSION

Scrub Typhus is an important cause of acute febrile illness that is caused by *Orientia tsutsugamushi*. It is transmitted by bite of larval stage (chigger) of a trombiculid mite¹.The bacteria multiply at the inoculation site with the formation of a papule that ulcerates and becomes necrotic, evolving into an eschar, with regional lymphadenopathy within few days. Vasculitis is the basic pathogenic mechanism in scrub typhus. It is responsible for skin rash, microvascular leakage, edema, tissue hypoperfusion and end organ ischemic injury⁷.

In this prospective study, we describe the clinical profile and laboratory findings of pediatric scrub typhus at a tertiary care teaching hospital in southern rajasthan. There were female predominance in the present study, with male: female ratio of 0.83:1, which similar to Kumar R et al². The mean age at presentation was 10.67 years in the study similar to Kumar et al¹. Majority of cases were reported during month of August to November (Rainy and post rainy season). There were only few cases during summer and winter season. The seasonal trend is observed in the study which coincide with wet season suitable for the growth of vegetation and trombiculid mite. Similar observations have been reported in many other studies^{8,11,12}. Majority of children 98.7% belongs to rural area similar to Bal et al⁹. This may be because most of rural population involve in farming and animal husbandry which make them susceptible to mite infestation. Domestic animals were present among (96.05%) of households of study population. People living with animals easily exposed to the mite because the animals are host for mite.

Fever was documented in all children in the present study similar to other studies^{8,10,11}, most (96.05%) had intermittent type and in (86.84%) children fever was associated with chills and rigors. Lakshamanan S et al¹⁰ reported chills and rigors in 27% cases. Other symptoms were vomiting (65.78%), headache (42.10%), abdominal pain (37.50%), bodyache (25%), altered sensorium (22.36%), cough (21.71%), breathlessness (19.07%), rash (12.5%), loose motion (10.52%) similar observations have been made by Kumar Bhat N et al¹¹ and Kumar et al⁸. and seizure seen in (3.94%) which less than what reported by Kumar Bhat N et al¹¹(20%).

Most common examination finding was fever recorded in all the children, Most (96.71%) had moderate to high grade fever(>101°F) similar to Kumar Bhat et al¹¹. Pallor was seen in (74.34%) of cases which could not be explained by disease per se and probably because of poor nutritional status and rural background of maximum cases. Kumar et al⁸ reported pallor in (47.8%) cases. And oedema (50%), hypotension (38.81%), rash (32.89%) cases similar to Kumar Bhat N et al¹¹ and Digra SK et al¹² reported rash in 100% contrary to present study. Hepatomegaly (29.60%), facial puffiness (28.94%), hepatosplenomegaly (24.34%), altered sensorium (22.36%), conjunctival congestion (21.05%), lymphadenopathy (regional) (17.76%), and splenomegaly in (6.57%) similar observations made by Lakshamanan S et al¹⁰ and Krishan R et al¹³ reported splenomegaly 68.52% and lymphadenopathy 59.26% contrary to present study. And bleeding (13.15%), neck rigidity (10.52%), icterus (9.86%) were other findings. Eschar which was pathognomonic of scrub typhus seen in (7.89%) children only in the present study. Other studies reported in 20% by Kumar Bhat N et al¹¹ and Krishan R et al¹³ reported eschar in 44.44%. and Kumar et al⁸ reported complete absence of eschar.

Leucocytosis was observed in (24.34%) and Leukopenia in (13.16%)

children, similar to Lakshmanan S et al¹⁰ And Gupta P et al¹⁴. And Saxena N et al⁶ observed leucocytosis in 16.6% and leucopenia in 8.3%, contrary to the present study. Thrombocytopenia seen in (76.31%) cases in present study, similar observations made by palanivel et al⁷(77%). Thrombocytopenia was not associated with an elevated hematocrit, a valuable clue which differentiates scrub typhus from dengue fever. Whereas Sankhyan et al¹⁵ reported thrombocytopenia all children, contrary to the present study. Hyponatremia seen in most of children (71.05%), none had severe hyponatremia (<120 mEq/L). Krishnan R et al¹³ reported hyponatremia in 80.56% children, And Lakshmanan S et al¹⁰ reported hyponatremia only in 3% children.

In the present study (32.23%) cases had elevated serum urea (>45 mg/dL). And (16.44%) children had elevated creatinine level >1.3mg/dL, similar observations made by Lakshmanan S et al¹⁰ elevated creatinine (>1mg/dL) seen in 14% children, And Kumar et al⁷ observed elevated creatinine (>1mg/dL) in 20% children. Majority of children (96.71%) had elevated SGOT (>37IU/dL), 66(43.42%) children had four fold rise in SGOT (>147 IU/dL) and majority of cases 91(59.86%) had elevated SGPT (>65IU/dL) and 7(4.60%) children had four fold rise in SGPT (>259 IU/dL). None had the severe hepatic dysfunction and hepatic coma. Similar observations made by Krishnan R et al¹³ and Dave M et al¹⁶. Lakshmanan S et al¹⁰ in their study reported elevated SGOT and SGPT in 21% children only contrary to the present study.

Among study population (50%) children had hypoproteinemia total serum protein <6gm/dL and hypoalbuminemia (albumin <3.5 gm/dL) observed in 144(94.73%) children and 70(46.05%) children had albumin level < 2.5 gm/dL. Hypoproteinemia in study population could be explained by hepatic dysfunction. Kumar R et al⁷ reported hypoalbuminemia (<3gm/dL) in 50.60% study population and Kumar et al⁸ reported hypoalbuminemia (<3gm/dL) in 41.7% children. Dave M et al¹⁰ in their study reported hypoproteinemia (<5.5 gm/dL) in 95% and serum albumin (<2.5gm/dL) in 92.08% of study population. Derangement in Hepatic and Renal functions is part of MODS as there is multisystem involvement in scrub typhus.

CONCLUSION :-

Scrub typhus is one of the common cause of acute febrile illness in children. A high degree of suspicion, a search for an eschar and knowledge of geographical distribution of rickettsial diseases is crucial for its early diagnosis, treatment and favourable outcome. In rural Rajasthan any child in rainy or post rainy season present with fever, bodyache, rash, hepatosplenomegaly, thrombocytopenia, and multiorgan dysfunction. Empirical therapy with doxycycline or azithromycin should be started, as delay in treatment would result in life threatening complications.

Conflict of interest-None

Funding-Nil

Ethical approval: The study was approved by the Institutional Ethics Committee

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