Section: Paediatrics

Original Research Article

PREVALENCE OF SCRUB TYPHUS IN CHILDREN PRESENTING AS ACUTE ENCEPHALITIS SYNDROME IN EASTERN PART OF MADHYA PRADESH

Received : 13/04/2023
Received in revised form : 10/05/2023
Accepted : 22/05/2023

Keywords:
Acute Encephalitis Syndrome, Scrub Typhus, Sensorium.

CorrespondingAuthor:
Dr. Shivanand Solanki,
Email: shivanand.solanki25@gmail.com

DOI: 10.47009/jamp.2023.5.3.193

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5(3); 939-943

Shiv Singh Manjhi[1], Shammi Kumar Jain[2], Krati Sharma[1], Shivanand Solanki[3]

[1]Senior Resident, Department of SRVS Medical College, Madhya Pradesh, India.
[2]Assistant Professor, Department of Pediatrics, SRVS Medical College, Madhya Pradesh, India.
[3]Senior Resident, Nandkumar Singh Chouhan Govt Medical College, Khandwa, Madhya Pradesh, India.

Abstract

Background: To assess prevalence of scrub typhus in children presenting as acute encephalitis syndrome in eastern part of Madhya Pradesh. **Materials and Methods:** 110 Hospitalized AES children of up to the age of 15 years in Pediatric intensive care unit of Gandhi Memorial Hospital Rewa M.P over a period of 14 months from August 2020 to October 2021 were enrolled. Signs and symptoms of cases for scrub typhus was recorded. For diagnosis purpose, samples of serum and CSF both were collected. Cerebrospinal fluid (CSF) and serum-I sample were collected on the day of admission before initiation of treatment and 2nd serum sample was collected 7 days interval in suspected patients. **Result:** The prevalence of scrub typhus was 50.90%. Scrub Typhus was more prevalent in the age group of 1-5 (41.07%) followed by 11-15 years (33.93%) and 6-10 years (25%). Scrub typhus was more prevalent in the month of August (46.43%) followed by September (19.64%) and October (10.71%). Scrub Typhus was more prevalent in Rewa (57.14%) followed by Satna (19.64%) and Sidhi (16.07%). Most common presenting symptom among Scrub Typhus positive patients was fever (100%), Altered sensorium (100%) followed by Seizures (80.36%), Nausea/Vomiting (66.07%), Irritability (58.93%), abdominal pain (51.79%), generalized swelling (16.07%) and swelling over face (12.50%). No significant difference was obtained in terms of HR (p=0.284) and RR (p=0.097) between those found positive and negative for Scrub Typhus. Tachycardia was present in 83.93% scrub typhus positive patients while 82.14% patients showed Tachypnea. Tachypnea was more prevalent in scrub typhus positive patients. Haemoglobin (8.64±1,64), TLC (14812.68±5546.385), Cells in CSF, Glucose in CSF, B. Urea, S. Creatinine and S. Albumin (2.565±.467; p=0.623) were found similar between positive and negative patients as revealed by the insignificant p value of >0.05. However, Neutrophils (55.63±15.568; P<0.001), platelet count (102035.71±68241.007; p=0.025), Na (137.619±7.156; P=0.019) and Ca was significantly lower in positive cases whereas Lymphocytes (38.98±14.805; P<0.001), SGOT (153.82±128.225; p=0.001), SGPT (147.67±16.557; P=0.021) was significantly higher in positive Scrub typhus cases compared to negative cases and elevated serum bilirubin was found in 19.64% of scrub typhus positive patients. Out of 56 patients, mortality was observed in 35.71% patients. **Conclusion:** The study revealed that Scrub Typhus was more prevalent in 1-5 year age group and most of the positive patients were males. Scrub Typhus was more prevalent in the month of August. Most common presenting symptom among Scrub Typhus positive patients was fever and altered sensorium. Prevalence of scrub typhus was found to be 50.90% and mortality was observed in 35.71% patients.

INTRODUCTION

As a major public health issue in Central India, Acute Encephalitis Syndrome (AES) is a frequent occurrence any age or season can experience. AES, which is defined by the WHO as an immediate onset of fever, a change in mental state (such as confusion or disorientation), or new onsets of seizures (such as coma or inability to speak). Children and young people are most typically affected, and the disease can have serious consequences in terms of death and morbidity.[1]

Neurologic symptoms of AES, which are clinically identical and caused by viruses such Japanese encephalitis virus, Herpes simplex (HSV), Dengue virus, West Nile virus, and several enteroviruses, are grouped together as AES.[2] One of the most common causes of AES is scrub typhus. Orientiatsugamushi, or scrub typhus, is an acute febrile sickness caused by infection with Orientiatsugamushi and characterized by focal or disseminated vasculitis, which may affect the lungs, heart, liver, spleen, and central nervous system.[3,4]

Scrub typhus can only be transferred through the bites of vectors, not directly from person to person. Chiggers of the trombiculid mite Leptotrombidium are the primary vector, but novel vectors have been discovered that can transmit this agent. As a public health issue, it's becoming more and more prevalent in India. Eastern part of Madhya Pradesh consists of the divisions of Rewa and Shahdol.[5] This part of MP has a humid subtropical climate, with cold, misty winters, hot summer and a humid monsoon season. Summers start in late March and go on till mid-June, the average temperature being around 30 °C (86 °F), with the peak of summer in May, when the highs regularly exceed 45 °C (104 °F). The monsoon starts in late June and ends in late September.[6] We performed this study to assess prevalence of scrub typhus in children presenting as acute encephalitis syndrome in eastern part of Madhya Pradesh.

MATERIALS AND METHODS

This cross-sectional study was conducted on 110 Hospitalized AES children of up to the age of 15 years in Pediatric intensive care unit of Gandhi Memorial Hospital Rewa M.P over a period of 14 months from August 2020 to October 2021. Patients' parent consent was obtained before starting the study.

Information was collected on a predesigned pilot tested proforma under following headings personal data (Name, age, gender) signs and symptoms of cases (fever, headache, rashes, nausea/vomiting, irritability, altered-sensorium, seizure, GI bleeding, abdominal pain, diarrhea rapid breathing, vital parameter (HR, RR, SPO2, BP,) and laboratory findings (CBC, LFT, RFT, Serum electrolytes (Na, k, Ca), CSF, IgM ELISA for scrub typhus. For diagnosis purpose, samples of serum and CSF both were collected. Cerebrospinal fluid (CSF) and serum-I sample were collected on the day of admission before initiation of treatment and 2nd serum sample was collected 7 days interval in suspected patients.

Samples were transported to the Microbiology laboratory (ICMR Jabalpur M.P.) in vaccine carriers. After receiving the CSF and blood samples along with the duly filled requisition forms from the Pediatrics department, serum was separated by centrifugation of the whole blood sample. The CSF and serum samples were transferred to sterile aliquots labelled with the particulars of the patient and preserved in the refrigerator at 4°C. A register was maintained in which the particulars of the patient were entered.

Cut off value = OD value of negative control x 3.0. For test samples with OD 450 nm less than cut off value was considered as negative. Test samples OD 450 nm greater than cut off value were considered as positive. Test samples with OD 450 nm excess to cut off value but less than OD of negative control by factor 5.0 were considered as equivocal. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

The prevalence of scrub typhus was 50.90%. Scrub Typhus was more prevalent in the age group of 1-5 (41.07%) followed by 11-15 years (33.93%) and 6-10 years (25%) [Table 1].

Table 1: Age distribution of scrub typhus patients

Age Group (Years)	Scrub				P value
	Negative		Positive		
	N	%	N	%	
1-5	27	50.00	23	41.07	0.494
6-10	14	25.93	14	25.00	
11-15	13	24.07	19	33.93	
Grand Total	54	100.00	56	100.00	

Table 2: Month wise prevalence

Month	Scrub				P value
	Negative		Positive		
	N	%	N	%	
February	3	5.56	0	0.00	0.006
March	4	7.41	0	0.00	

ISSN(O): 2687-5365; ISSN(P): 2753-6556

May	0	0.00	1	1.79	
June	3	5.56	2	3.57	
July	3	5.56	5	8.93	
August	12	22.22	26	46.43	
September	11	20.37	11	19.64	
October	2	3.70	6	10.71	
November	16	29.63	5	8.93	
Grand Total	54	100.00	56	100.00	

In present study we found that scrub typhus was more prevalent in the month of August (46.43%) followed by September (19.64%) and October (10.71%) [Table 2].

Table 3: District wise prevalence

District	**Scrub**				**P value**
	Negative		**Positive**		
	N	**%**	**N**	**%**	
PANNA	3	5.56	1	1.79	0.565
REWA	30	55.56	32	57.14	
SATNA	11	20.37	11	19.64	
SHAHDOL	1	1.85	1	1.79	
SIDHI	5	9.26	9	16.07	
SINGRAULI	4	7.41	2	3.57	
Grand Total	54	100.00	56	100.00	

District wise prevalence showed that Scrub Typhus was more prevalent in Rewa (57.14%) followed by Satna (19.64%) and Sidhi (16.07%) [Table 3].

Table 4: Distribution according to different parameters

Parameters		**Scrub**				**P value**
		Negative		**Positive**		
		N	**%**	**N**	**%**	
HR	Normal	5	9.26	9	16.07	0.284
	Tachycardia	49	90.74	47	83.93	
RR	Normal	17	31.48	10	17.86	0.097
	Tachypnea	37	68.52	46	82.14	

No significant difference was obtained in terms of HR (p=0.284), RR (p=0.097) between those found positive and negative for Scrub Typhus. Tachycardia was present 83.93% in scrub typhus positive patients while in 82.14% patients shows Tachypnea. Tachypnea was more prevalent in scrub typhus positive patients [Table 4].

Table 5: Comparing mean laboratory parameters in Scrub patients

Group Statistics					
	SCRUB	**N**	**Mean**	**Std. Deviation**	**P value**
Hb	Negative	54	9.34	2.22	0.062
	Positive	56	8.64	1.64	
TLC	Negative	54	16023.85	6529.053	0.062
	Positive	56	14812.68	5546.385	
N	Negative	54	68.50	12.545	<0.001
	Positive	56	55.63	15.568	
L	Negative	54	27.30	14.871	<0.001
	Positive	56	38.98	14.805	
M	Negative	54	4.78	1.525	0.239
	Positive	56	5.14	1.700	
E	Negative	54	2.69	1.552	0.163
	Positive	56	3.09	1.493	
B	Negative	54	.00	.000	0.328
	Positive	56	.04	.267	
Platelet Count	Negative	54	142248.15	113135.804	0.025
	Positive	56	102035.71	68241.007	
Na	Negative	54	141.55	9.92	0.019
	Positive	56	137.619	7.156	
K	Negative	54	4.08	.719	0.034
	Positive	56	4.455	1.06	
Ca	Negative	54	9.762	1.06	0.043
	Positive	56	9.297	1.295	
Cells in CSF	Negative	54	13.81	14.711	0.153
	Positive	56	10.02	12.917	
Glucose in CSF	Negative	54	79.65	71.688	0.726
	Positive	56	75.34	56.409	
SGOT	Negative	54	89.33	62.024	0.001

ISSN(O): 2687-5365; ISSN(P): 2753-6556

	Positive	56	153.82	128.225	
SGPT	Negative	54	90.834	11.646	0.021
	Positive	56	147.67	16.557	
S. Bilirubin	Negative	54	.837	1.151	0.045
	Positive	56	1.45	1.94	
B. Urea	Negative	54	46.1667	22.82894	0.082
	Positive	56	59.0629	49.17741	
S. Creatinine	Negative	54	0.84	0.90	0.768
	Positive	56	0.80	0.82	
S. Albumin	Negative	54	2.617	.629	0.623
	Positive	56	2.565	.467	

Haemoglobin (8.64±1,64), TLC (14812.68±5546.385), Cells in CSF, Glucose in CSF, B. Urea, S. Creatinine and S. Albumin (2.565±.467; p=0.623) were found similar between positive and negative patients as revealed by the insignificant p value of >0.05. However, Neutrophils (55.63±15.568; P<0.001), platelet count (102035.71±68241.007; p=0.025), Na (137.619±7.156; P=0.019) and Ca was significantly lower in positive cases whereas Lymphocytes (38.98±14.805; P<0.001), SGOT (153.82±128.225; p=0.001), SGPT (147.67±16.557; P=0.021) were significantly higher in positive cases compared to negative Scrub Typhus and elevated serum bilirubin was found in 19.64% of scrub typhus positive patients [Table 5].

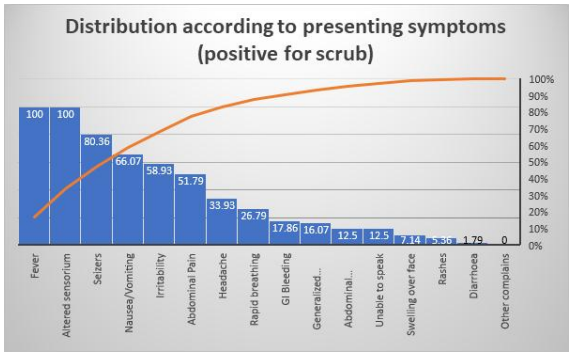

Figure 1: Distribution according to presenting symptoms (positive for scrub)

Most common presenting symptom among Scrub Typhus positive patients was fever (100%), Altered sensorium (100%) followed by Seizures (80.36%), Nausea/Vomiting (66.07%), Irritability (58.93%), abdominal pain (51.79%), generalized swelling (16.07%) and swelling over face (12.50%) [Figure 1].

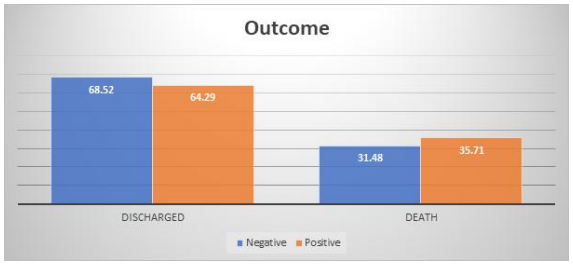

Figure 2: Mortality

Out of 56 patients, mortality was observed in 35.71% patients [Figure 2].

DISCUSSION

People of all ages are susceptible to AES because it causes fever and changes in mental state (mental confusion, disorientation, delirium, inability to talk or convulsions) at any time of the year. 59Morbidity and death are regular consequences of the condition, which mostly affects children and young people.[7] AES has a complex etiology. Acute encephalitis can be caused by viruses, bacteria, Mycobacteria, Rickettsia, Toxoplasma, and malaria. Acute encephalitis is almost always due to a virus infection. Southeast Asia is plagued with JE and dengue fever.[8] We performed this study to assess prevalence of scrub typhus in children presenting as acute encephalitis syndrome in eastern part of Madhya Pradesh.

The prevalence of scrub typhus was 50.90%. Scrub Typhus was more prevalent in the age group of 1-5 (41.07%) followed by 11-15 years (33.93%) and 6-10 years (25%). In present study, we found that scrub typhus was more prevalent in the month of August (46.43%) followed by September (19.64%) and October (10.71%). Children with scrub typhus have a wide range of symptoms and consequences, according to a study by Kumar M et al,[9] Scrub typhus was found in 35 children between the months of February 2010 and February 2011 by the authors. Age group was between between 1.5 years and 12 years. 60 % of patients had edema, 23% had crackles/rhonchi, 91% had hepatomegaly, and 34 % had hypotension. An eschar was seen in 11% of the patients studied. Acute renal injury and myocarditis with cardiogenic shock were both seen in 34% of patients. 31% and 61% percent of the patients had anicteric hepatitis and thrombocytopenia. Mortality was reported in one patient .Acute renal injury and myocarditis were found to be common, indicating that the children were treated late in the disease process. Pediatric scrub typhus can cause myocarditis and acute renal damage, both of which are life-threatening.

District wise prevalence showed that Scrub Typhus was more prevalent in Rewa (57.14%) followed by Satna (19.64%) and Sidhi (16.07%). Most common presenting symptom among Scrub Typhus positive patients was fever (100%), Altered sensorium (100%) followed by Seizures (80.36%), Nausea/Vomiting (66.07%), Irritability (58.93%), abdominal pain (51.79%), generalized swelling

ISSN(O): 2687-5365; ISSN(P): 2753-6556

(16.07%) and swelling over face (12.50%). No significant difference was obtained in terms of HR (p=0.284 and RR (p=0.097) between those found positive and negative for Scrub Typhus. Tachycardia was present 83.93% in scrub typhus positive patients while in 82.14% patients shows Tachypnea. Tachypnea was more prevalent in scrub typhus positive patients. Haemoglobin (8.64±1,64), TLC (14812.68±5546.385), Cells in CSF, Glucose in CSF, B. Urea, S. Creatinine and S. Albumin (2.565±.467; p=0.623) were found similar between positive and negative patients as revealed by the insignificant p value of >0.05. However, Neutrophils (55.63±15.568; P<0.001), platelet count (102035.71±68241.007; p=0.025), Na (137.619±7.156; P=0.019) and Ca was significantly lower in positive cases whereas Lymphocytes (38.98±14.805; P<0.001), SGOT (153.82±128.225; p=0.001), SGPT (147.67±16.557; P=0.021) was significantly higher in positive cases compared to negative Scrub Typhus and elevated serum bilirubin was found in 19.64% of scrub typhus positive patients. Out of 56 patients, mortality was observed in 35.71% patients. Scrub typhus patients hospitalised to an urban referral centre were investigated by Palanivel S et al,[10] for their clinical characteristics and outcomes. All of the children had a fever, according to the researchers. 46 %and 35 % of the cases had eschar and rash, respectively. 73 percent, 59 %, 58 %, and 43 %, respectively, had cough, vomiting, altered sensorium, and oliguria. More than 80% of youngsters had hepatosplenomegaly and pale skin as the most prevalent symptoms. Edema, lymphadenopathy, and icterus were also discovered. Patients with anaemia, thrombocytopenia and increased liver enzymes were found in 77%, 64% and 49%, respectively. Ascites, shock and respiratory failure were found in 61%, 47% and 46% of the cases correspondingly. 10% of patients had acute renal failure, 10% had hepatic failure, 10% had multiorgan dysfunction syndrome (MODS), 7% had meningoencephalitis, and 4% had acute respiratory distress syndrome (ARDS). There were two types of antibiotics used: doxycycline and azithromycin. 11.94% of the patients died. Shock, ARDS, acute renal failure (ARF), MODS, and disseminated intravascular coagulation (DIC) all contributed to the patient's death (DIVC). Acute febrile illness, maculopapular or erythematous rash, hepatosplenomegaly, lymphadenopathy and characteristics suggesting capillary leak should be included in the diagnosis of Scrub Typhus, and the kid should be started on empirical therapy with doxycycline or azithromycin, which is lifesaving.

CONCLUSION

It was observed that Scrub Typhus was more prevalent in 1-5 -year age group. Majority of the Scrub Typhus positive patients were males.Maximum cases were seen in the month of August. Most common presenting symptom among Scrub Typhus positive patients was fever and altered sensorium. Prevalence of scrub typhus was found to be 50.90% and mortality was observed in 35.71% patients.

REFERENCES

1. Harris PNA, Oltvolgyi C, Islam A, Hussain-Yusuf H, Loewenthal MR, Vincent G, Stenos J, Graves S, An outbreak of scrub typhus in military personnel despite protocols for antibiotic prophylaxis: doxycycline resistance excluded by a quantitative PCR-based susceptibility assay. Microbes and infection. 2016 Jun [PubMed PMID: 27005452]
2. Lee CS, Hwang JH, Lee HB, Kwon KS. Risk factors leading to fatal outcome in scrub typhus patients. The American journal of tropical medicine and hygiene. 2009 Sep [PubMed PMID: 19706919]
3. Choi YH, Kim SJ, Lee JY, Pai HJ, Lee KY, Lee YS. Scrub typhus: radiological and clinical findings. Clinical radiology. 2000 Feb [PubMed PMID: 10657161]
4. Jeong YJ, Kim S, Wook YD, Lee JW, Kim KI, Lee SH, Scrub typhus: clinical, pathologic, and imaging findings. Radiographics : a review publication of the Radiological Society of North America, Inc. 2007 Jan-Feb [PubMed PMID: 17235005]
5. Ki YJ, Kim DM, Yoon NR, Kim SS, Kim CM. A case report of scrub typhus complicated with myocarditis and rhabdomyolysis. BMC infectious diseases. 2018 Nov 7.
6. Pradhan B, Jindal A, Acute encephalitis syndrome following scrub typhus infection. Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine. 2014 Oct. [PubMed PMID: 25316985]
7. Kim SJ, Chung IK, Chung IS, Song DH, Park SH, Kim HS, Lee MH. The clinical significance of upper gastrointestinal endoscopy in gastrointestinal vasculitis related to scrub typhus. Endoscopy. 2000.
8. Sun IO, Kim MC, Park JW, Yang MA, Lee CB, Yoon HJ, Kim JG, Lee KY, Clinical characteristics of acute kidney injury in patients with scrub typhus--RIFLE criteria validation. Journal of infection and chemotherapy: official journal of the Japan Society of Chemotherapy. 2014 Feb [PubMed PMID: 24485324]
9. Kumar M, Krishnamurthy S, Delhikumar CG, Narayanan P, Biswal N, Srinivasan S. Scrub typhus in children at a tertiary hospital in southern India: clinical profile and complications. J Infect Public Health. 2012 Mar;5(1):82-8.
10. Palanivel S, Nedunchelian K, Poovazhagi V, Raghunadan R, Ramachandran P. Clinical profile of scrub typhus in children. Indian J Pediatr. 2012 Nov;79(11):1459-62.

ISSN(O): 2687-5365; ISSN(P): 2753-6556