

Clinical Experience of Scrubs Typhus Patients in a Tertiary Care Hospital of Eastern India

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ABSTRACT

Background- Scrubs typhus, an acute febrile illness caused by the bacteria *Orientia tsutsugamushi* which is a Rickettsia tsutsugamushi infection worldwide. During the 2nd world war, scrub typhus caused is the most common re-emerging Rickettsia tsutsugamushi infection, resulting in morbidity & mortality in the border region and other Southeastern East Asia.

Methods- This retrospective study was conducted from 2015 to 2020 at AMRI Hospitals Bhubaneswar. A total number of 122 patient data was studied for this survey. Significant clinical findings such as fever, Jaundice, GIT symptoms were studied also including basic test parameters like renal profile, liver function test, respiratory, cardiac vascular, central nervous system dysfunction. The clinical data obtained were entered in Microsoft Excel-2019 later converted into a statistical package for social science (SPSS) 11.5 version for statistical analysis.

Results- Symptoms such as a high-grade fever, chills, shortness of breath, heart and vascular involvement, renal involvement, and jaundice are not the same as tropical fever. For an average day of fever, it was found that it lasted an average of 8 days. Two or more than two number of organ failures were shown to be the most common cause of death for patients. The duration of stay in the intensive care unit (ICU) is seven days, whereas the duration of stay on the general ward is eleven days. Acute renal

damage (36%) and jaundice (38%) were also seen in 76 and 38 percent of patients, respectively. Acute respiratory distress syndrome, necessitating a non-invasive ventilator seen in 42% of patients hospitalized, whereas acute renal damage, requiring hemodialysis, accounted for 12% of patients admitted. Meningitis or meningoencephalitis is the most predominant manifestation of central nervous system. While heart failure, myocardial infarction, and ECG abnormalities were also found to be involved

Conclusion- Scrub typhus is now among the most common causes of acute fibril illness in India. Scrub typhus is a re-emerging disease in India after decades. Early diagnosis and management are significant because there is a phenomenal reaction to treat with antibiotics which shall help in reducing mortality and disease complication from this infectious disease.

Key Words- Scrub Typhus, *Orientia tsutsugamushi*, Multiorgan dysfunctions, Early diagnosis

INTRODUCTION

Scrubs typhus, an acute febrile illness caused by the bacteria *Orientia tsutsugamushi*[1] which is a *Rickettsia tsutsugamushi* infection worldwide[2][3]. During the 2nd world war, scrub typhus caused is the most common re-emerging *Rickettsia tsutsugamushi* infection, resulting

in morbidity & mortality in the border region and other Southeastern East Asia[4]. It is estimated that >1million cases are reported each year in Asia-specific regions. This re-emerging disease was found particularly to be distributed in the tsutsugamushi triangle India, Pakistan, Sri Lanka, Japan, Thailand, Korea, extending from Afghanistan to Northern Australia [5][6][7][8]. This vector-borne infection is most common in rural areas as compared to urban areas, where there is limited access to hospitals, diagnosis methods, and treatments[9]. This colossal disease can range from mild, i.e., asymptomatic to severe, i.e., lethal[10]. Neglect in treatment or delayed diagnosis scrub typhus leads to a life-threatening situation. In 1999, the World Health Organization (WHO) professed that “*Scrub typhus is probably one of the most underdiagnosed and underreported febrile illnesses requiring hospitalization in the region*”[1][11].

Orientia tsutsugamushi, which is a gram-negative bacteria, spreads the infection through the bite of infected trombiculid (*Leptotrombidium* and *L. palladium*) mites at the larval stage, which is known as a chigger[2][12][7]. Scrubs typhus fever not spread by contact touching of people. It only spreads by the bite of an infected chigger[13][14]. Chiggers, like skin that is thin, delicate, or wrinkled[6]. Chiggers are known to take advantage of hair follicles or pores rather than piercing the host epidermis[15]. The saliva secreted by the mites may disintegrate host tissue surrounding the feeding site. Chigger target most of the organs include skin, heart, lung, brain, kidney, pancreases. The bacteria multiply at the inoculation site and ulcerate form a blank crust like a skin burn from a cigarette. Mite salivary glands have been shown to contain *Orientia tsutsugamushi* [15]. The major routes for keeping *Orientia* in the mite are transovarial and transstadial transmission, with a few reports suggesting the bacteria may also be transferred to mites while co-feeding and from wild rodents[16][17][18][19]. The infection is

maintained in the vector from one life stage to the next, i.e., the transit of *O. tsutsugamushi* from mite larva to nymphs and then from nymphs to adult. The mechanism of transmitting *O. tsutsugamushi* from the mother to offspring through eggs is known as transovarial transmission[19][20]. In vertical transmission, both transmission systems are used. There have been a few recorded cases of *Orientia* horizontal transmission among mites[21]. A chigger obtains *Orientia* from an infected host through horizontal transmission, and its progeny infects a new host. There is insufficient data to show that horizontal transmission is an important way of maintaining *O. tsutsugamushi* in nature [16][18][21][22]. In the present research, we studied the clinical experience of this infection in 122 In-patients that reported to this tertiary care hospital from 2015-2020.

MATERIALS AND METHOD

This retrospective study was conducted from 2015 to 2020 at AMRI Hospitals Bhubaneswar (a super specialty hospital in eastern India). A total number of 122 patients with an acute febrile illness an Escher on clinical examination and conformed to have scrub typhus with a positive scrub typhus enzyme-linked immunosorbent assay (ELISA) technique (InBios International, Inc., USA; optical density >0.5 was considered positive). Patients above 18 years of age with acute fever (>2 days) and subject to be rickettsial disease were included in the study. We excluded patients (<18 years) with laboratory-confirmed malaria and dengue. All IgM scrub typhus serology-positive cases fulfilled the inclusion criteria. The age group ranges from 18 to 84 years. Significant clinical findings such as fever. Jaundice, GIT symptoms. Apart from that, Investigations include basic test parameters like renal profile, liver function test, respiratory, cardiac vascular, central nervous system dysfunction.

These clinical data were entered in Microsoft Excel-2019 later converted into a

statistical package for social science (SPSS) 11.5 version for statistical analysis. For descriptive statistics, the percentage was calculated along with the graphical and tabular presentation. The result is depicted below.

OBSERVATION

All 122 patients were diagnosed with scrub typhus at AMRI Hospitals, Bhubaneswar, during the period between 2015 and 2020. During this period maximum number of patients, 24.59%, were admitted in 2019.

Among the 122 patients, females and males are 44 (36.07%) and 78 (63.98%). The age of the patient ranged from 13 to 80 years. Patients more than 44 age found to be a maximum of 84 (68.85%). The details about the demographic are shown in Table 2.

In this study, the most common presentation is a high grade of fever and chills. The maximum number of patients who had a fever of more than 7 days is 64.75%. Among these patients, the pathogenic Escher and rash were seen in

7.38% and 4.92%. The number of patients having complications with ≤ 2 number of an organ is 52.46, which is more than the patients having complications with > 2 number of organ Table 2.

Table 1: Year-wise patients admitted to hospital

Years	Number of Cases	%
2015	13	10.66
2016	17	13.93
2017	29	23.77
2018	29	23.77
2019	30	24.59
2020	4	3.28

Table 2: The demographic details, Clinical Signs, and Symptoms of admitted patients.

Demographic details	Number of patients admitted	Percentage (%)
Gender		
	Female	44
	Male	78
Age		
	<18	4
	18-44	34
	>44	84
Clinical Symptoms		
Fever		
	<7	40
	≥ 7	79
Clinical signs		
	Eschar	9
	Rash	6
Organ Failure		
	≤ 2	64
	> 2	44

Table 3: Clinical manifestation of all the patients admitted to hospitals.

Year	Number of Patients admitted	Respiratory distress (%)	NIV (%)	Hepatic (%)	AKI (%)	HD (%)	CVS (%)	CNS (%)
2015	13	100.0	46.2	15.4	15.4	0.0	23.1	23.1
2016	17	46.5	52.9	35.3	58.8	0.0	23.5	23.5
2017	29	86.2	58.6	51.7	31.0	17.2	34.5	31
2018	29	62.1	34.5	44.8	31.0	13.8	31	17.6
2019	30	66.7	20.0	33.3	46.7	10.0	56.7	33.3
2020	4	100.0	100.0	25.0	0.0	75.0	50	50

All the patients admitted to the hospital were involved with respiratory distress, hepatic, cardiovascular, and problem-related to the central nervous system.

Table 3 shows that among the admitted patients in 2018, 62.1% patients were involved in respiratory distress, which is lower compared to other years. Those who were involved in respiratory distress are required non-invasive ventilator; in 2020 (100%), patients were required NIV (Non-invasive ventilator).

Table 3 suggests that in 2019 (48%) are involved in acute kidney injury (AKI),

but among them, only (10%) patients have required hemodialysis (HD). It was seen that the problem involved in the hepatic system is most common in patients admitted each year. Those patients were disease interaction with the cardiovascular system (CVS) involved in heart failure and myocardial infraction found in (56.7%) 2019. In 2020 (50%) patients have the commonest interaction is meningitis/meningoencephalitis in the central nervous system (CNS).

Table 4 shows the fatality rate, in 2019 the fatality rate is 20% over other years. We examined the clinical profile of 6

patients who were complications with acute kidney injury, abnormalities in ECG, heart failure, myocardial infarction, and meningitis. All these patients are treated with doxycycline alone, and it is also perceived that the average day staying in ICU (Intensive Care Unit) is 16days; among them, only 50% of patients were affected with jaundice.

Table 4: Fatality index of admitted patients.

Year	Patients admitted to hospital	Fatality	Percent (%)
2015	13	1	7.7
2016	17	1	5.9
2017	29	5	17.2
2018	29	2	6.9
2019	30	6	20.0
2020	4	0	0.0

We further analyzed the collected data, and found that patients in this research had a wide range of symptoms and characteristics. Symptoms such as a high-grade fever, chills, shortness of breath, heart and vascular involvement, renal involvement, and jaundice are not the same as tropical fever. For an average day of fever, it was found that it lasted an average of 8 days. Two or more than two number of organ failures were shown to be the most common cause of death for patients. The duration of stay in the intensive care unit (ICU) is seven days, whereas the duration of stay on the general ward is eleven days. Acute renal damage (36%) and jaundice (38%) were also seen in 76 and 38 percent of patients, respectively. Acute respiratory distress syndrome, necessitating a non-invasive ventilator seen in 42% of patients hospitalized, whereas acute renal damage, requiring hemodialysis, accounted for 12% of patients admitted. Meningitis or meningoencephalitis is the most predominant manifestation of central nervous system. While heart failure, myocardial infarction, and ECG abnormalities were found to be associated with cardio vascular system. In our study, the case fatality rate was 12.2%. Antibiotics like doxycycline and chloramphenicol were used to treat the infection in accordance with the conventional therapy.

Ciprofloxacin and azithromycin were also used.

CONCLUSION

Scrub typhus is now among the most common causes of acute fibril illness in India. Scrub typhus is a re-emerging disease in India after decades. There are several factors that result in the re-occurrence of this disease, such as deforestation of forest for cropping & industrial use, poor hygiene, environmental change, and lack of diagnostic tests. This is a preliminary study, the commonest presenting symptoms of high-grade fever with chills. A strong understanding of this disease involved acute kidney injury, heart failure, myocardial infarction, jaundice, and meningitis/meningoencephalitis. Among them, multi-organ failure, respiratory distress, and heart failure are more prominent to life-threatening complications that lead to a higher grade of fatality rates. Scrub typhus prevention techniques are needed to minimize the spread of the endemic region and reduce annual incidence. Plans for health promotion that educate the most vulnerable on personal protection, personal hygiene, and environmental cleanliness are steps in the right direction. Scrub typhus is spread by mites, so wearing oversized shirts and trousers in woodland areas, avoiding keeping possibly mite-infested objects in homes, and being aware of mite activity are control measures. Travelers visiting endemic regions should be educated on precautions such as suitable attire and environmental awareness. Early diagnosis and management is significant because there is a phenomenal reaction to treat with an antibiotic such as doxycycline, chloramphenicol, azithromycin, and ciprofloxacin which will help in reducing mortality and disease complication from this infectious disease.

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