

## A Study on Epidemiological Aspects, Clinical Spectrum, Treatment and Outcome of Scrub Typhus in a Tertiary Care Hospital

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Conflict of interest: Nil

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### Abstract

**Background:** The objective of the present investigation was to study epidemiological profile, clinical manifestation, laboratory features, complication and out-come of scrub typhus.

**Methods:** This is a prospective descriptive study at a tertiary care hospital including patients diagnosed scrub typhus positive for (IgM by standard Q card test).

**Results:** Out of the total 42 study patients, 25 (59.53%) patients of scrub typhus were male and 17 (40.47%) were female, in age group 6-10 years, there were 20 (47.65%) patients. Children > 6 years had more cases due to more outdoor play is in this age group. monsoon season had more patients 30(71.43%) because mites are more active during monsoon and post monsoon season. Fever was the common presentation of all the cases followed by 20 (47.61%) had rash, 25 (59.52%) had vomiting. 25 (59.23%) had Hepatosplenomegaly, 19 (45.23%) had anemia, 22 (52.38%) had thrombocytopenia, Impaired liver function due to elevated SGOT 18 (42.86%) and, SGPT 15 (35.72%). Associated disease showed 6 (14.28%) had hepatitis A. Complications showed 9 (21.42%) had meningoencephalitis followed by MODS 3 (7.14%). Rural areas constitute more patients due to availability of more shrubs and forest areas. Mortality was observed in 7% of cases.

**Conclusions:** The present study concluded that a high index of suspicion about scrub typhus must be look and investigated for, so timely treatment can prevent morbidity and complication, because early diagnosis and treatment is only modality which can prevent complication, and fatal outcome of scrub typhus.

**Keywords:** Scrub typhus, SGOT, SGPT, Demographic profile.

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## Introduction

Scrub typhus is an acute infectious disease which present as acute undifferentiated febrile illness. Scrub typhus caused by *Orientia* (previously rickettsia) *tsutsugamushi*, which is an obligate intracellular bacterium of variable severity[1]. That is transmitted to humans by larval trombiculid mite an arthropod vector of the Trombiculidae family. Humans are accidental hosts It affects all ages including old age and children[2,3].

Humans are accidental hosts. Scrub typhus is confined geographically to the Asia pacific region. During the Second World War, scrub typhus emerged out to be one of the most dreaded diseases among the soldiers of the Far East. More than a billion people are at risk and nearly around million cases are reported every year of scrub typhus[3]. Mortality rates for scrub typhus range from < 1% to 50%[24]. In India, it is present in whole of the Shivalik ranges from Kashmir to Assam, Eastern Ghats and Western Ghats, and also in Vindhyaachal and Satpura ranges in the central part of India[2]. Due to lack of awareness, and a low index of suspicion among clinicians, and health care workers paucity of confirmatory diagnostic facilities and clinical symptoms which mimics other more prevalent diseases such as malaria dengue, and leptospirosis, scrub typhus is under diagnosed in India, especially in Rajasthan[18].

The average incubation period of *Orientia Tsutsugamushi* (scrub typhus) in humans is 10–12 days. at the onset of disease is characterized by fever, headache, myalgia, nausea, vomiting, cough, shortness of breath, maculopapular rashes, abdominal pain, altered sensorium, and[5], hepatosplenomegaly, edema, Lymphadenopathy, an eschar, and a tick bite or tick exposure[6]. The severity of the symptoms varies, depending on the susceptibility of the host, the virulence of the

bacterial strain, or both. At the end of 2<sup>nd</sup> week, at the end of the 2<sup>nd</sup> week, systemic symptoms develop mostly involving the central nervous system, cardiovascular system, renal, respiratory, and gastrointestinal systems. Serious complication in the form of Myocarditis, pneumonia, meningoencephalitis, acute renal failure, and gastrointestinal bleeding may occur[7].

## Need of study

Scrub typhus may cause mild symptoms, serious complications, or even death. The overall mortality varies from 7% to 30%, early diagnosis and treatment are imperative to reduce the mortality and the complications associated with the disease. The aim of this retrospective study was to provide detailed information of clinical aspects of this disease based on a large patient population, thus helping to create a better clinical and laboratory profile of this re-emerging disease.

## Methods

### Study site

The current study entitled “A Study on Epidemiological Aspects, Clinical Spectrum, Treatment and Outcome of Scrub Typhus in a Tertiary care hospital was conducted in 42 patients aged (1-18) years admitted in Geetanjali medical college and hospital, Udaipur, Rajasthan.

**Study duration:** This study was conducted at Geetanjali Medical College and Hospital (GMCH) Udaipur from Jan 2020 to June 2021. Total duration was 12 months.

**Study design:** Prospective Descriptive study.

**Study criteria:** The study group consisted of clinically suspected scrub typhus patients with IgM positive by standard Q card test.

**Sample size estimation:** All patient positive with scrub typhus for (IgM by standard Q card test) During study period of (January 2020 to June 2021) have been enrolled.

**Inclusion criteria:** Those patients having clinical feature of scrub typhus and tested positive for scrub typhus (IgM antibody) by standard Q card method (SD Biosensor)

**Exclusion criteria:** Parents who do not give consent to participate in case study.

**Method of collection of data:** All eligible children those having clinical features of scrub typhus with Positive (IgM antibody) by standard Q card method have been consecutively Enrolled in the study after taking prior informed consent from the parents. Demographic profile, relevant information of individual patient has been collected using well-structured proforma by interviewing the Parents/attendant. At the time of enrollment, detailed evaluation and Physical examination of each patient has been done. Detailed anthropometry measurements have been taken with appropriate techniques.

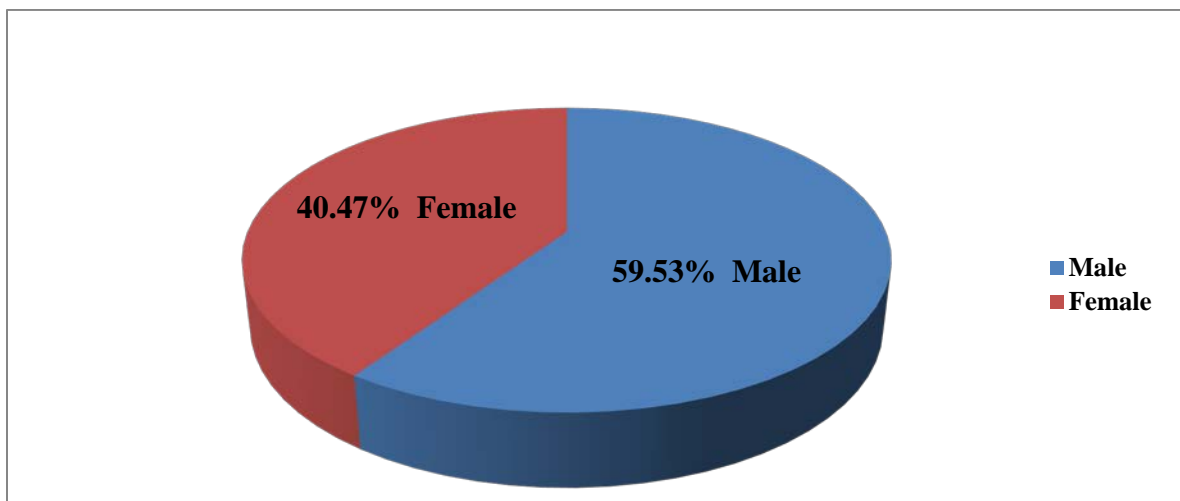
**Statistical analysis:** Data is entered into MS excel software. Statistical analyses have been performed using the statistical packages for social science (SPSS) version 21 IBM

Corporation statistical analyses for categorical variables have been compared between using the chi-squared test.

**Results:** The study was conducted to see the trends of scrub typhus Epidemiological Aspects, Clinical Spectrum, Treatment and Outcome in Rajasthan. Total 42 cases aged (1-18) years were positive for scrub typhus by for (IgM by standard Q card test) between January 2020 to January 2021. Among that 1(2.38%) patient left against medical advice. Rural areas constitute more patients due to availability of more shrubs and forest areas. Maximum numbers of cases observed in monsoon and post monsoon because mites are more active during monsoon and post monsoon season.

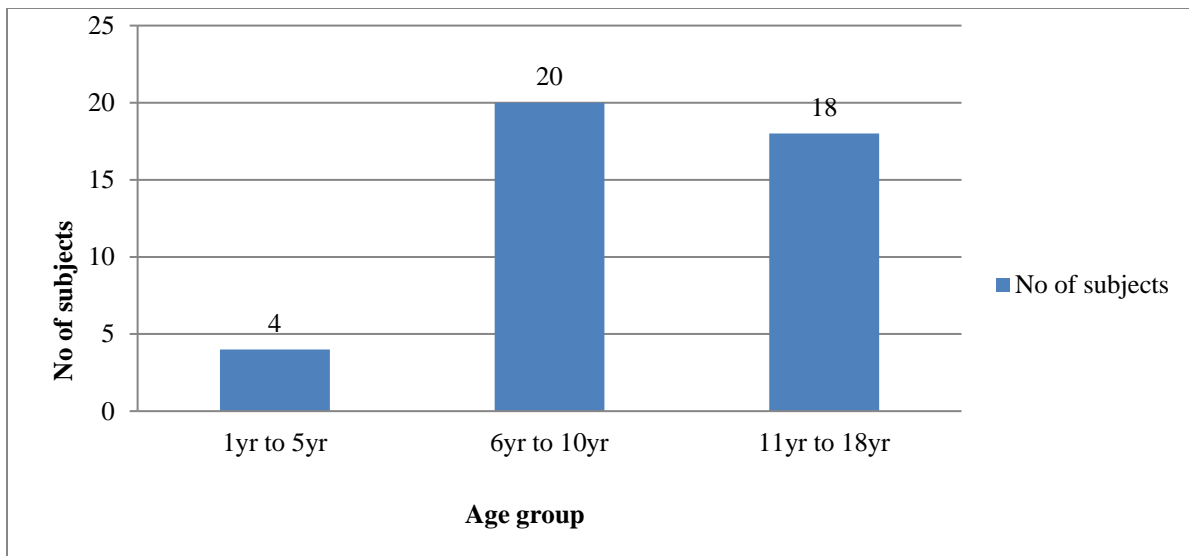
#### Demographic data

**Gender distribution of scrub typhus cases:** Figure 1 depicts predominance of the male gender in the admission to a tertiary care hospital. Among 42 cases, 25 (59.53%) of patients of scrub typhus were male and 17 (40.47%) were female.



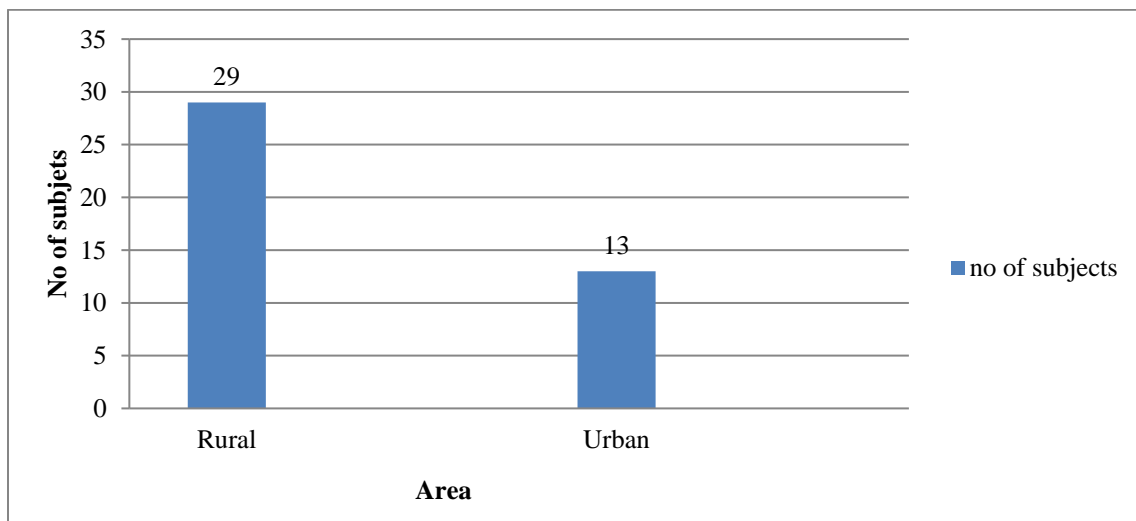
**Figure 1: Distribution of study population according to gender**

**Age distribution:** Figure 2 shows Out of the total 42 study patients, in the age group 1-5 years there were 4 (9.5%) patients and in age group 6-10 years, there were 20 (47.65%) patients and in age group 11-18 years there were 18 (42.85%) patients. Children > 6 years had more cases due to more outdoor play is in this age group.



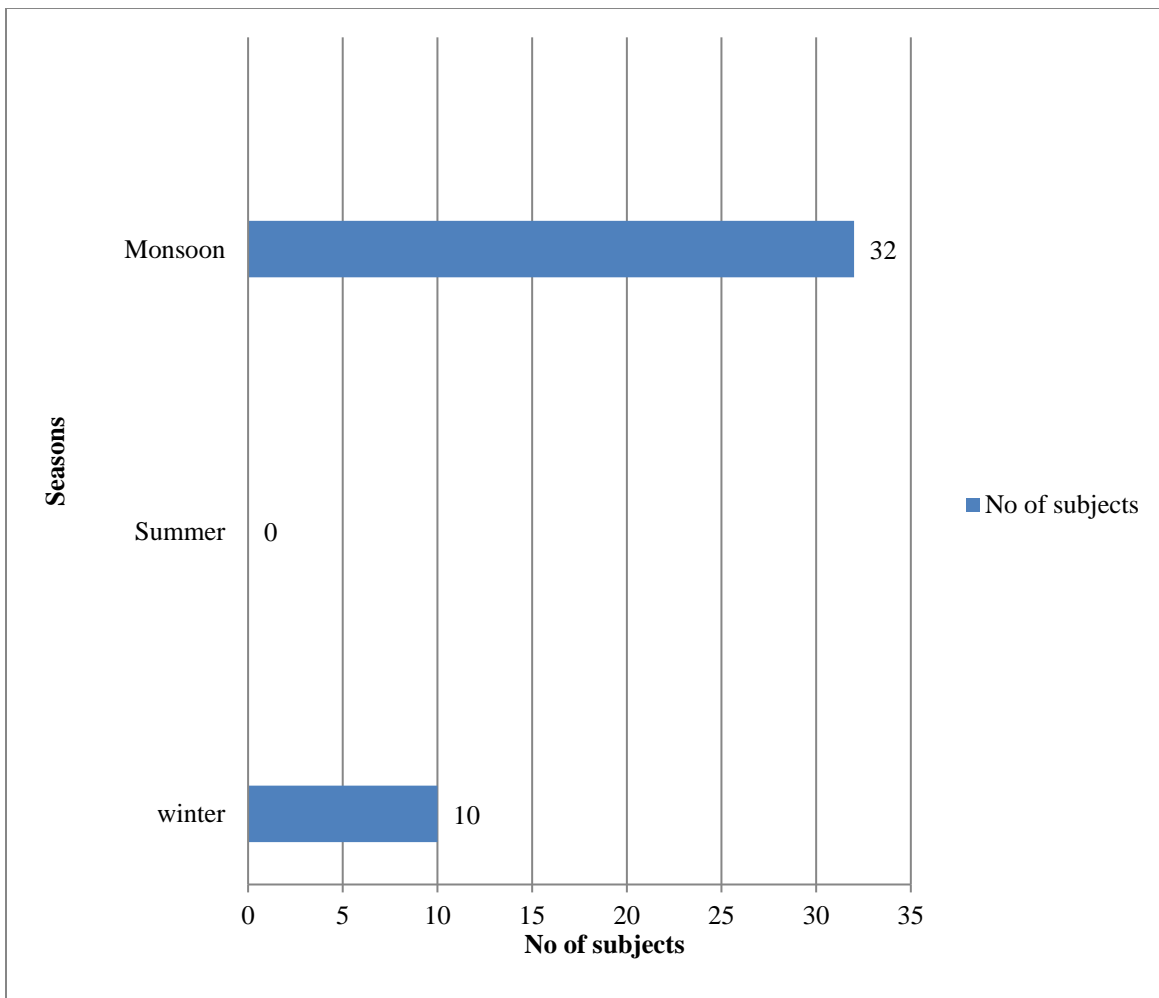
**Figure 2: Distribution of study population to age group**

**Distribution of population according to urban and rural area of residence of study:** Figure 3 shows out of the total 42 patients, 29 (69.04%) were living in rural areas and 13 (30.96%) were living in urban areas.



**Figure 3: Distribution of population according to urban and rural area of residence of study**

**Seasonal distribution:** Figure 4 shows Seasonal distribution of scrub tyohus cases, according to season 10 cases (23.81%) reported during winter, no case was reported during summer, and 30 (71.43%) reported during monsoon season.

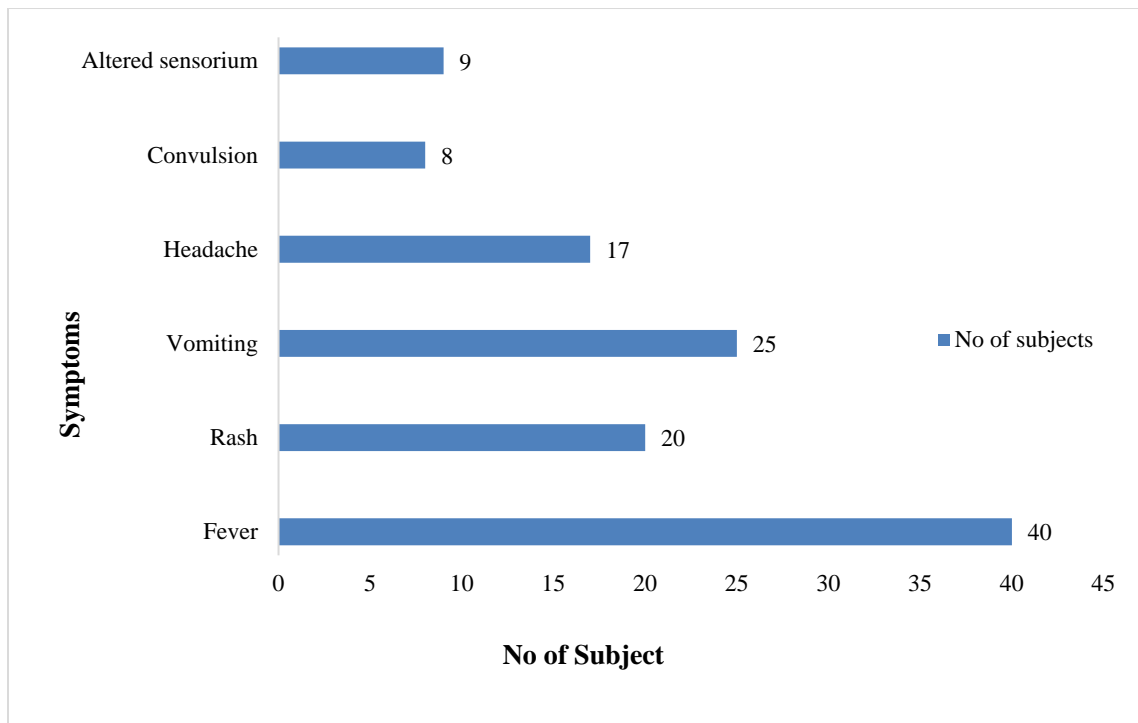


**Figure 4: Seasonal distribution of scrub typhus cases**

As shown in table 1 and figure 5, Fever was a most common symptoms in all cases of scrub typhus. It shows 40 (95.23%) had fever, 20 (47.61%) had rash, 25 (59.52%) had vomiting, 17 (40.47%) had headache, and 8 (19.04%) had convulsion, and 9 (21.42%) had Altered sensorium.

**Table 1: Clinical profile of patients with scrub typhus**

Symptoms	No of subjects No=42	percentage (%)
Fever	40	95.23%
Rash	20	47.61%
Vomiting	25	59.52%
Headache	17	40.47%
Convulsion	8	19.04%
Altered sensorium	9	21.42%

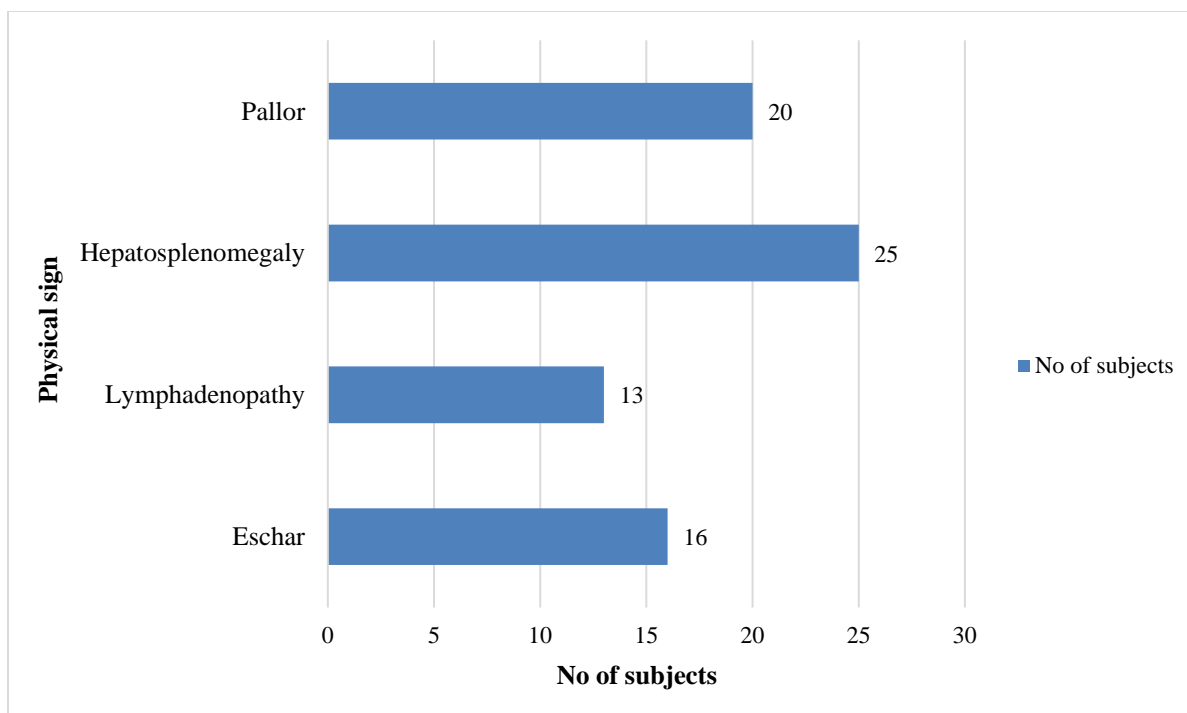


**Figure 5: Clinical profile of patients with scrub typhus**

On physical examination, as shown in table 2 and figure 6, hepatosplenomegaly 25 (59.23%) was common among other physical sign followed by pallor 20(47.61%) and 16 (38.09%) had eschar, 13 (30.95%) had Lymphadenopathy.

**Table 2: Physical Signs of patients with scrub typhus**

Signs	No of subjects No=42	Percentage (%)
Eschar	16	38.09%
Lymphadenopathy	13	30.95%
Hepatosplenomegaly	25	59.52%
Pallor	20	47.61%

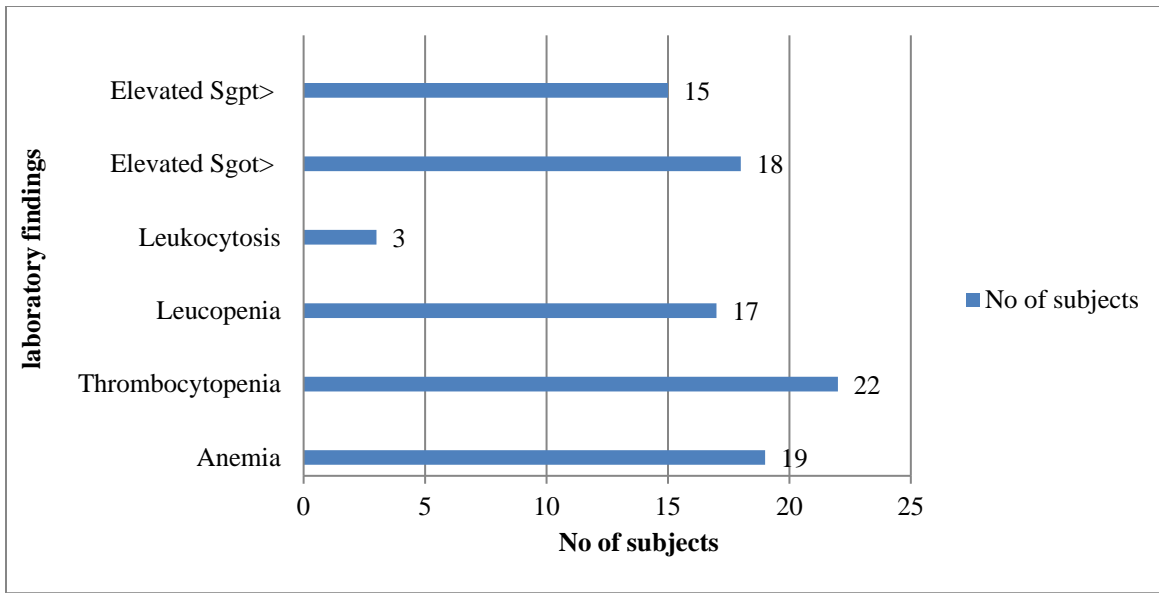


**Figure 6: Physical signs of patients with scrub typhus**

As shown in table 3 and figure 7, On laboratory examination out of the total 42 patients, 19 (45.23%) had anemia, 22 (52.38%) had thrombocytopenia, few patients had Leukocytosis 3 (7.14%), 17 (40.47%) had leucopenia. Impaired liver function due to elevated SGOT 18 (42.86%) and, SGPT 15 (35.72%).

**Table 3: Laboratory examination of patients with scrub typhus**

Laboratory investigation	No of subjects No=42	percentage (%)
Anemia	19	45.23 %
Thrombocytopenia	22	52.38%
Leukopenia	17	40.47 %
Leucocytosis	3	7.14 %
Elevated SGOT>	18	42.86 %
Elevated SGPT>	15	35.72 %



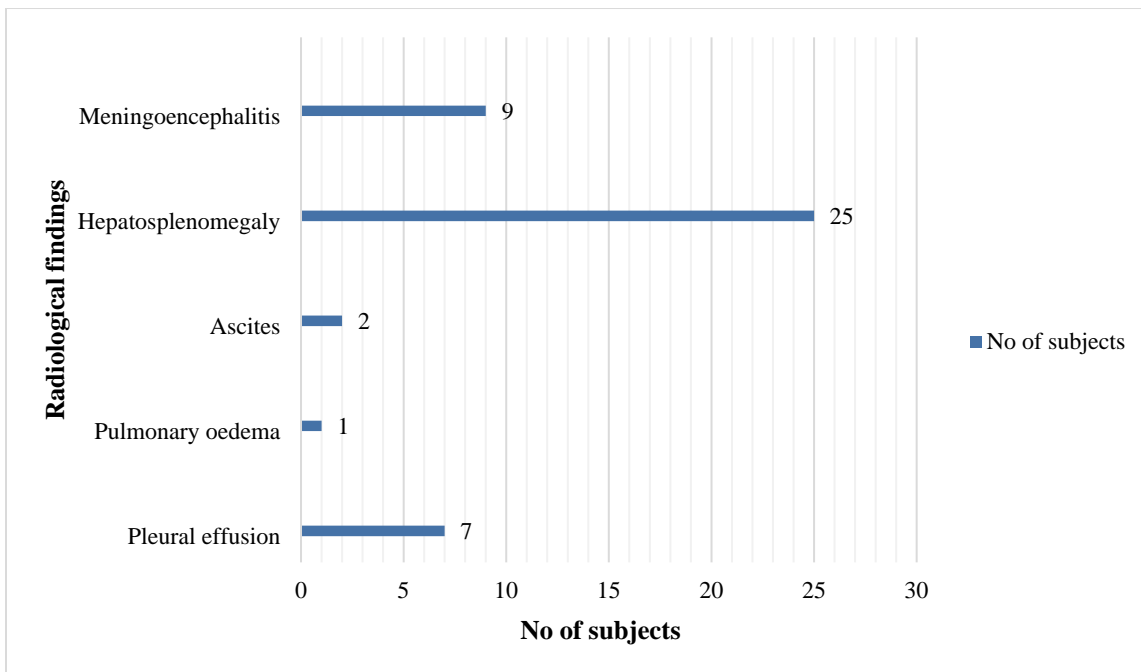
**Figure 7: Laboratory examination of patients with scrub typhus**

On radiological findings 25 (59.52%) had hepatosplenomegaly most common among all radiological findings followed by meningoencephalitis which is 9 (21.42%) table 4, figure 8.

**Table 4: Study of Radiological findings of patients of scrub typhus**

Radiological findings	No of subjects No=42	Percentage (%)
Pleural effusion	7	16.66%
Pulmonary oedema	1	2.3%
Ascites	2	4.25%
Hepatosplenomegaly	25	59.52%
Meningoencephalitis	9	21.42%



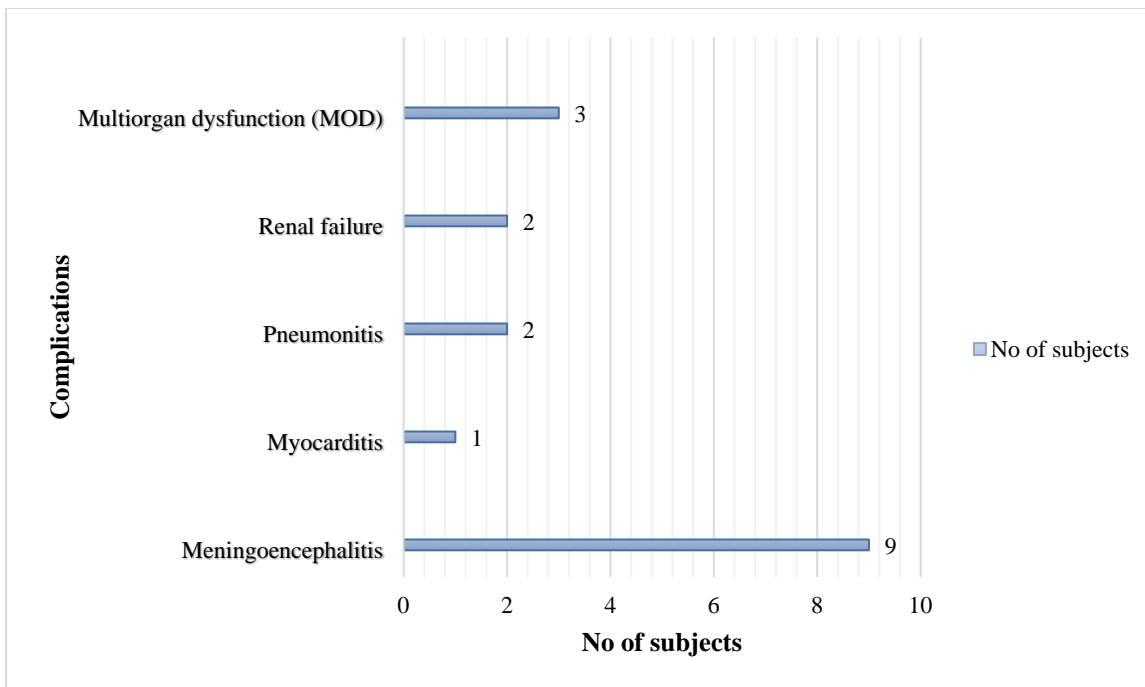


**Figure 8: Study of Radiological findings of patients of scrub typhus**

Among the complication Meningoencephalitis (9 (21.42%) was most common disease among all cases of scrub typhus followed by MOD etc. as shown in Table 5, figure 9.

**Table 5: Complications associated with scrub typhus**

Complications	No of subjects No=42	Percentage (%)
Meningoencephalitis	9	21.24%
Myocarditis	1	2.38%
Pneumonitis	2	4.76%
Renal failure	2	4.76%
Multiorgan dysfunction (MOD)	3	7.14%

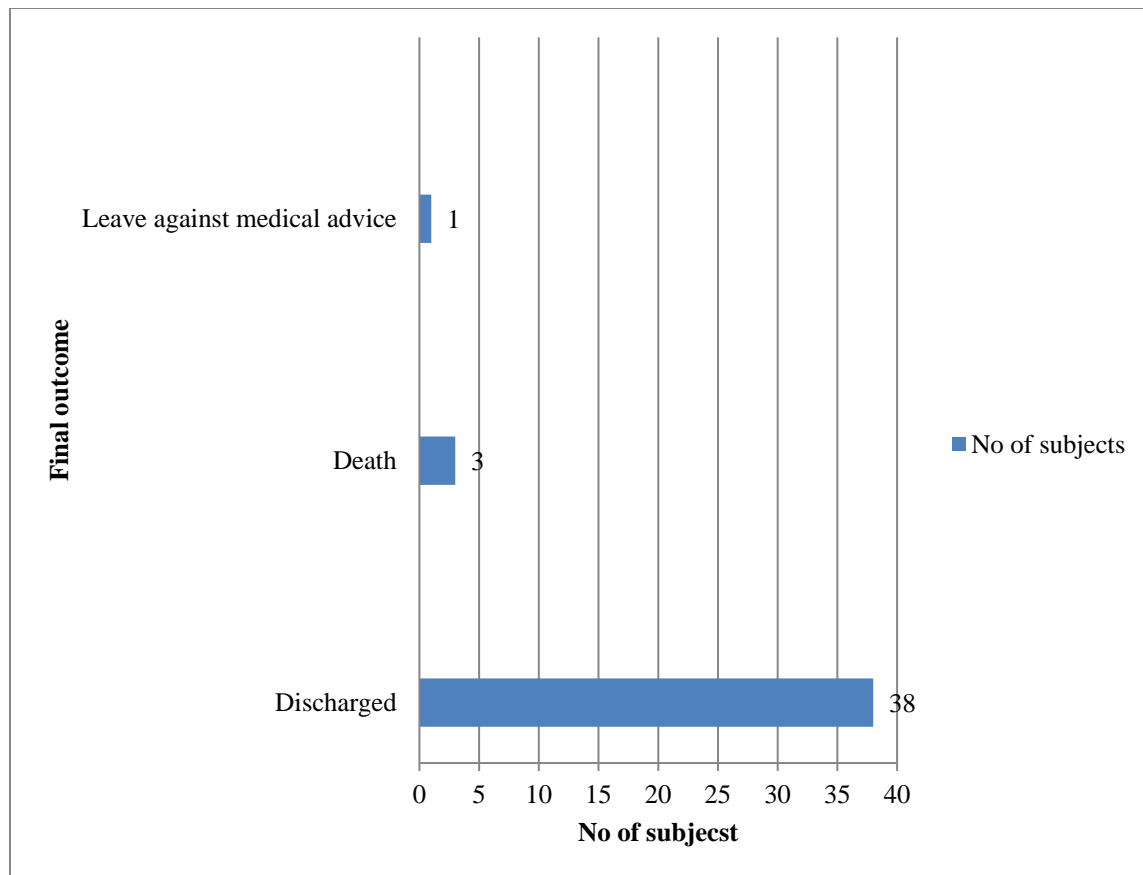


**Figure 9: Complications associated with scrub typhus**

As shown in table 6 and figure 10, out of 42 patients 38 (90.47%) were discharged, 3 (7.14%) succumbed to death and, 1 (2.38%) left against medical advice

**Table 6: study of final outcome of patients with scrub typhus**

Final outcome	No of subjects	Percentage (%)
Discharged	38	90.47%
Death	3	7.14%
Leave against medical advice	1	2.38%
Total	42	100%



**Figure 10: study of final outcome of patients with scrub typhus**

### Discussion:

Scrub typhus is an acute infectious disease which present as acute undifferentiated febrile illness. Scrub typhus caused by *Orientia (previously rickettsia) tsutsugamushi*, which is an obligate intracellular bacterium of variable severity[1]. The infection may be acquired in both rural and semi-urban environments and thus an enormous human population is likely to be at risk[23]. Humans get infected when they encroach upon mite-infested areas. Like rural and suburban areas. It is often acquired during recreational, occupational and agricultural exposure because crop fields are an important reservoir for transmission of scrub typhus[4]. It is the most common re-emerging Rickettsial infection in India and many other South East Asian countries[3]. Mortality rates for scrub typhus range from < 1% to 50% depending on proper antibiotic treatment used, status of the individual infected, and the strain of *O.*

*tsutsugamushi* encountered[24]. Scrub typhus is endemic and is re-emerging in eastern and southern parts of Asia. In India, it is present in whole of the Shivalik ranges from Kashmir to Assam, Eastern Ghats and Western Ghats, and also in Vindhya and Satpura ranges in the central part of India[2].

In our study, Gender wise distribution of the patients shows dominance of the male gender in the admission to a tertiary care hospital. 25 (59.53%) of patients of scrub typhus were male and 17 (40.47%) were female. It was observed that the male to female ratio in our study was 60:40 which is comparable to study by Huang *et al* in their study showed 17(60.7%) were males and 11(39.3%) females[9]. Digra *et al.*, (2010) in their study reported Male: Female ratio was reported as follows, Male 11 (52.3%) Female 10 (47.6%)[8].

The age range of the patients was 1 to 18 years. Muthukrishnan K *et al*, they included

84 patients in the age group 1 to 18 years[10]. In a study by Tanvi *et al*, they included 88 patients with age group of 1.5 to 18 years[11]. Adhikari S *et al*. (2003) included 43 patients in the age of 1 to 16 years[12], while Kumar Bhat N *et al*. (2009) included 66 patients between 1 to 18 years of age in his study[13].

Age, sex, residential area and occupation are known to influence the occurrence of scrub typhus. Children playing outdoors tend to be afflicted more often. Rural areas constitute more patients due to availability of shrubs and forest areas are more in these areas. In current study out of 42 subjects, 29 (69.04%) were from rural areas and 13 (30.96%) were from urban areas, rural areas comprise more patients as forestry and shrubs covered more parts of rural areas. In a study by Gupta VK *et al*, they reported out of 10 patients, 9 (90%) patients were from rural area and 1(10%) patient was from urban area[14]. Kumar Bhat N *et al* reported out of 66 patients, 58 (88%) were from rural area and 8 (12%) were from urban area[13].

Monsoon season had more patients because mites are more active during monsoon and post monsoon season. Most of the cases were seen during the monsoon season 32 (76.19%) and winter 10 (23.81%) as compared to summer season no case was reported. In a study by Tanvi *et al*, out of 88 patients, no case was reported in summer season, 58 (65.91%) cases were reported in monsoon, and 30 (34.09%) cases were reported in winter season[11]. In a study by Digra *et al*, they showed out of 21 cases, no cases were shown reported in summer season, 12 (57.1%) cases were reported in monsoon and 9 (42.8%) cases were reported in winter season[8]. Such post-monsoon seasonality was reported earlier BS Kalal's study, R bithu's study[21,22]. This is because the mites are more active during or at the end of monsoon season which is the months of August to October.

As shown in result, most common complaint of children was fever 40 (95.23%), followed by rash 20 (47.61%) and vomiting 25 (59.52%), Other common symptoms were headache 17 (40.47%), convulsion 8 (19.04%), and altered sensorium 9 (21.42%). Palanivel *et al*. also observed fever in all patients, rash (35%) and vomiting altered sensorium were present in 59% and 58% respectively[15]. As predominant symptoms after fever. In a study by Patil *et al*, they reported fever and rash (100%), altered sensorium (52%), Convulsions (46%)[16].

On physical examination, we noted hepatosplenomegaly 25 (59.52%), eschar 16 (38.09%), Lymphadenopathy 13 (30.95%) and pallor 20 (47.61%) as the most common signs at presentation. However, the presence of eschar varies from 11% - 75% in various studies, like studies by Murali Krishnan *et al*, and Palanivel *et al*. [18,15] Eschar is a useful sign for diagnosis of scrub typhus and must be differentiated from anthrax and other Rickettsial infections.

It is the result of a painless chigger bite and is often located in warm parts of body such as the genital region or under the axilla where clothing is tight. It evolves as a small papule, enlarges, undergoes central necrosis, and acquires a blackened crust. In a study by Kumar Bhat N *et al*, they showed eschar 13 (20%), Lymphadenopathy 25 (38%), and pallor in 06 (9%)[13]. Gupta VK *et al* On examination reported hepatosplenomegaly in 7 cases (70%), Lymphadenopathy in 3 cases (30%), and 2 patients had eschar (20%), 3 (30%) Patients were diagnosed with pallor[14]. In our study, we observed eschar in the, axilla, thigh and perineum, which was in similar parts with other pediatric studies. Similar to the observations of Patil *et al* who reported hepatosplenomegaly in 85% cases[16] while Mahajan *et al* reported the same in 43% cases[17]. Laboratory examination of subjects showed It was also observed that, out of the total 42 subjects, 19 (45.23%) had anemia, 22 (52.38%) had

thrombocytopenia, 3 (7.14%) had leukocytosis, 17 (40.47%) had leucopenia, 18 (42.86%) had elevated SGOT and, 15 (35.72%) SGPT was elevated. Similar to our study, Palanivel *et al* found out elevated SGOT and SGPT in 64% of cases[15], and Murali Krishnan *et al* also showed thrombocytopenia in more than 50% of children[18].

In a study Dave *et al*, reported anemia 265 (55.20%) cases. Kumar Bhat N *et al* reported, Thrombocytopenia 35 (53%), anemia 41 (62%), and elevated liver enzyme 34 (51%) cases[13].

We also found that in our study of radiological findings of patients of scrub typhus, hepatosplenomegaly 25 (59.52%) is most common among all radiological finding followed by meningoencephalitis 9 (21.42%) etc. Muthukrishnan K *et al*, reported hepatosplenomegaly 35 (44%), and meningoencephalitis 7 (11.3%) cases[10] and another study by Palanivel *et al*. reported meningoencephalitis 6% cases[15].

In our study we had complications in 17 (40.47%) subjects. It means out of the total 42 subjects, 17 (40.47%) patients had complications in which 9 (21.42%) had Meningoencephalitis as most common complication associated with scrub typhus followed by 1 (2.38%) had Myocarditis, 2 (4.76%) had pneumonitis, 2 (4.76%) had Renal failure and, 3 (7.14%) had MODS. Which is comparable to studies, Patil *et al* showed Myocarditis 4%[16]. Bhat NK *et al* reported pneumonitis 7 (10.6%) slightly higher as compared our study[13].

In other study Muthukrishnan k *et al* reported Meningoencephalitis 7 (11.3), Multiorgan dysfunction syndrome 4 (6.4) cases. Renal failure is also another complication that associated with scrub typhus patients[10]. Palanivel *et al* reported renal failure in 10%, meningoencephalitis in 6%, MODS in 7%[15]. M. Kumar *et al* reported pneumonitis in 1(3%) case[19]. Nallasamy K *et al* reported

Myocarditis in 5 (3%) cases[20]. In current study, average duration of hospital stays in patients with scrub typhus reported, in which out of the total 42 subjects, 28 (66.66%) stayed for 1-5days, 10 (23.80%) stayed for 6-10 days, and 4 (9.52%) stayed for 11-14 days which were mainly complicated cases. In a study by Gupta VK *et al*, they reported duration of hospital stay 5 to 12 days[14]. Various studies showed 7 days to 13 days hospital stay. In a study Nallasamy K *et al* showed average duration of hospital stay 7 days comparable to our study 7.83 days[20].

In current study, final outcome of patients of scrub typhus admitted in our hospital was also reported, in which 38 (90.47%) were successfully discharged, 3 (7.14%) 3 (7.14%) succumbed to death and, 1 (2.38%) left against medical advice. In another study by Muthukrishnan K *et al* reported 79 (94%) of patients recovered and discharged, whereas 4 (4.7%) number of patients died of complications[10] which is quite similar to our study Gupta VK *et al* reported, 9 (90%) patients were recovered and 1 (10%) patient was succumbed to death due to complication[14].

### Conclusion

Scrub typhus is caused by *Orientia tsutsugamushi* and is spread by bite of larval trombiculid mites. The infection presents as a nonspecific febrile illness which may be associated with gastrointestinal, central nervous or respiratory symptoms. Rickettsial infections have been documented from various parts of India. There have been reports of outbreaks of scrub typhus in the eastern and southern states of India with serological evidence of widespread prevalence of scrub typhus, particularly during the monsoon and winter seasons. The study shows various kinds of clinical manifestation and complications associated with scrub typhus and outcome of study is also well explained. On the basis of detailed information obtain from study. When child presents with

undifferentiated acute high grade febrile illness with maculopapular rash, hepatosplenomegaly, in an endemic zone in monsoon and post monsoon season, a high index of suspicion about scrub typhus must be look and investigated for, so timely treatment can prevent morbidity and complication, because early diagnosis and treatment is only modality which can prevent complication, and fatal outcome of scrub typhus.

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