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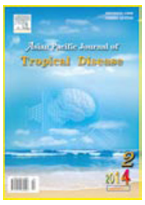

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Predictors of scrub typhus: a study from a tertiary care center

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ABSTRACT

Objective: To document the clinical and laboratory findings of scrub typhus infection and to determine the prognostic factors of the disease.

Methods: Retrospective data were collected from 96 patients with scrub typhus infection, from January 2012 to December 2013, at Yashoda hospital, Hyderabad. Prognostic factors for severe scrub typhus were analyzed by a multivariate analysis.

Results: Out of 96 patients, men were 47 (48.9%) and median age was 39 years. Patients with low socioeconomic status were 53 (55.3%). Among the 96 patients 46 (47.9%) had severe scrub typhus, 50 (52.1%) had mild severe scrub typhus. Two patients (2%) died. Symptoms of cough (P=0.001), presence of eschar (P<0.001), Glasgow coma scale (GCS) below 12 (0.04), hepatomegaly (P=0.0001), splenomegaly (P=0.000 1), and meningoencephalitis (P=0.01), were significantly associated with severe scrub typhus. Multivariate analysis showed presence of eschar (odds 2.5; 95% confidence interval (*CI*) 1.1-8.5), hepatomegaly (odds 1.9; 95% *CI* 1.1-3.8), meningoencephalitis (odds 4.8; 95% *CI* 1.1-21.8), GCS<12 (odds 1.8; 95% *CI* 0.5-2.4) and cough (odds 1.5; 95% *CI* 0.7-3.5) to be significantly associated with severe scrub typhus.

Conclusions: In our study, eschar, hepatomegaly, meningoencephalitis, poor GCS and cough were significantly associated with severe scrub typhus.

1. Introduction

Scrub typhus is a rickettsial disease caused by *Orientia tsutsugamushi* (formerly called *Rickettsia tsutsugamushi*), an obligatory intra-cellular Gram-negative bacterium[1]. It can be transmitted to human and other vertebrates by the bite of an infected larval trombiculid mite (chigger)[2]. It is widespread, especially seen in the so called "tsutsugamushi triangle," which includes Australia, Japan, Taiwan, China, South Korea, the islands of the Western Pacific region, Indonesia and Indian subcontinent[3]. Scrub typhus is endemic in India and has been reported from all parts of north, east and south India[4-6]. Recent reports from several parts of India have noted an increase in the incidence of scrub typhus[7]. Majority of people affected with scrub typhus, are those working in agriculture fields works, oil palm and rubber plantations workers, and belong to low-socioeconomic population[8,9].

Scrub typhus presents as an acute febrile illness with constitutional symptoms, rashes, myalgias, and headache. It may involve the tissues of any organ system and can lead to organ dysfunction and these include kidney (acute renal failure), liver (hepatitis), lungs (acute respiratory distress syndrome), central nervous system (meningitis), or may cause circulatory collapse with haemorrhagic features[10]. Scrub typhus is under-diagnosed, as its clinical features are non-specific, diagnostic facilities are not easily accessible, and most clinicians have a low index of suspicion for this disease[11]. The aim of the study was to retrospectively analyze clinical features, risk factors, disease severity and

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mortality in patients with scrub typhus from the medical records of patients admitted to this tertiary educational hospital for the last two years.

2. Materials and methods

Patients diagnosed with scrub typhus and admitted in Department of Medicine, Yashoda Hospital Malakpet, Hyderabad, were included in this study. Yashoda Hospital is a referral center in South India, the states of Andhra Pradesh and Telangana. Scrub typhus was diagnosed based on the modified definition given by the World Health Organization[11]. We collected the data retrospectively, of all scrub typhus cases in the study period from January 2012 to December 2013. During the two years, 130 patients diagnosed to have scrub typhus were initially selected. Out of the 130 patients, 15 patients had incomplete laboratory tests data and 19 patients did not have clear diagnosis. Remaining 96 patients' were included in the study and their data were collected. This study was approved by the Institutional Scientific Committee.

Patient's medical history (clinical and physical examination), reports of laboratory investigations, including complete blood count, serum creatinine, blood urea, serum albumin, serum glucose, liver function tests, urine analysis (including urine albumin), abdominal ultrasound, cerebrospinal fluid (CSF) analysis and chest X-rays were collected from medical records for all patients. Twenty (20.8%) patients had CT scan brain, 15 (15.6%) patients underwent magnetic resonance imaging of brain and these were performed as per the clinician's discretion. Electroencephalogram was done in 25 (26%) patients. Out of 96 scrub typhus patients, 2 patients succumbed to the disease. Two groups were divided in this study- mild disease and severe disease of scrub typhus[12-15].

2.1. Serological examination

In the present study, Weil-Felix test was performed in all patients (100%) as it is economical yields rapid results (low sensitivity and specificity) and immuno-chromatographic test (ICT) was performed in 85 (88.5%) patients. This is a rapid diagnostic test with sensitivity of 97.6% and specificity of 72% for scrub typhus.

2.2. Statistical analysis

Statistical analysis was performed using SPSS 13.0 software (statistical package for the Social sciences, SPSS Inc). Mean ±SD were calculated. The paired *t* test was applied to test the differences in continuous variables. Univariate and multivariate analysis was performed for potential confounders age, gender, cough, chest X-ray abnormal, blood urea, hepatomegaly, splenomegaly, Glasgow coma scale (GCS)<12, meningoencephalitis, *etc*. All tests were two sided and *P* value <0.05 were considered statistically significant.

3. Results

A total of 96 patients with scrub typhus were included in the study. Men constituted 48.9% with a median age of 39 years and age range of 15-70 years. Co-morbid illness and possible risk factors hypertension, diabetic mellitus and history of smoking were seen in 25 (26%), 18 (18.7%) and 15 (15.6%) patients, respectively. Mean duration of fever before admission was (5.6±2.1) d. Most common symptoms were cough noted in 49 (51.0%) patients, abdominal pain in 42 (43.7%), nausea/vomiting in 41 (42.7%), diarrhea in 39 (40.6%), melena in 12 (12.5%), and convulsions/ seizure in 5 (5.2%) patients. On clinical examination, splenomegaly was present in 42 (42.8%), hepatomegaly in 26 (26.5%) and eschar was present in 20 (20.8%). The other demographic and features at admission are given in Table 1.

Table 1
Baseline characteristics.

Parameters	Number (*n*=96)
Men	47 (48.9%)
Median age years	39
Age range years	15-70
Hypertension	25 (26.0%)
Diabetic mellitus	18 (18.7%)
Smoking	15 (15.6%)
Alcoholics	10 (9.6%)
Mean duration of fever before admission (days)	5.6±2.1
Cough	49 (51.0%)
Melena	12 (12.5%)
Chest X-ray abnormal	52 (54.1%)
Eschar present	20 (20.8%)
Mean erythrocyte sedimentation rate	58.1±29.3
Platelet count <20000/mL	10 (10.2%)
GCS<12	20 (20.8%)
Increased urine serum albumin	29 (30.2%)
Creatinine>2 mg/dL	8 (8.1%)
Blood urea	40.50±4.30
Serum albumin below levels (g/dL)	30 (31.0%)
Nausea, vomiting	41 (42.7%)
Abdominal pain	42 (43.7%)
Diarrhea	39 (40.6%)
Mean alkaline phosphatase	215.22±144.80
Mean serum glutamic-oxaloacetic transaminase (SGOT)	180.3±127.2
Mean serum glutamic pyruvic transaminase (SGPT)	164.1±101.2
Convulsions/ seizure	5 (5.2%)
Headache	74 (77.0%)
Meningoencephalitis.	13 (13.5%)
CSF protein elevation	25 (26.0%)
CSF sugar elevation	30 (31.2%)
Body temperature (°C)	35.65±6.80
Systolic blood pressure (mmHg)	102.0±15.1
Diastolic blood pressure (DBP) (mmHg)	64.5±12.8
Pulse (beats/min)	106.0±29.4
Respiration (breaths/min)	27.4±9.4
Hepatomegaly	26 (26.5%)
Splenomegaly	42 (42.8%)
Low socioeconomic status	60 (62.5%)
Deaths	2 (2.0%)