

Assessment of Liver Function Tests among Patients with Scrub Typhus Fever

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Abstract

Background: Scrub typhus fever, a rickettsiosis caused by *Orientia tsutsugamushi*, usually seen in mountainous and forest areas, is now being normally characterized among patients in urban areas presenting with symptom of febrile illness in monsoon and post monsoon season. It has a varied presentation of signs and symptoms associated with morbidity and mortality today. Hence all cases with symptom of febrile illness ought to be investigated and high suspicion of rickettsiosis mainly scrub typhus.

Material & Methods: The present cross-sectional study includes 200 Patients who had scrub typhus IgM antibody positive were enrolled from outdoor and from ward by simple random sampling. Clearance from Institutional Ethics Committee was taken before start of study. Written informed consent was taken from each study participant.

Results: Among the total study participants 42 (21%) had normal serum ALT levels, 52 (26%) patients had serum ALT levels raised less than Two-folds, 48 (24%) patients had serum ALT levels raised more than Two-folds, 42 (21%) patients had serum ALT levels raised more than four-folds and 16 (8%) patients had serum ALT levels raised more than ten folds. Among the total study participants 30 (15%) had normal serum AST levels, 52 (26%) patients had serum AST levels raised less than Two-folds, 56 (28%) patients had serum AST levels raised more than Two-folds, 50 (25%) patients had serum AST levels raised more than four-folds and 12 (6%) patients had serum AST levels raised more than ten folds.

Conclusion: We concluded from the present study that liver function test deterioration among scrub typhus fever was varied from normal range of biochemical markers to raised liver function markers. AST elevation was observed more statistically significant than ALT elevation. Hyperbilirubinemia and raised alkaline phosphatase levels were also observed. Low serum albumin levels were associated with the critical phase of the liver disease.

Key words: Scrub typhus fever, AST, ALT.

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Introduction

Scrub typhus fever, a rickettsiosis caused by *Orientia tsutsugamushi*, usually seen in mountainous and forest areas, is now being normally characterized among patients in urban areas presenting with symptom of febrile illness in monsoon and post monsoon season. It has a varied presentation of signs and symptoms associated with morbidity and mortality today[1]. Hence all cases with symptom of febrile illness ought to be investigated and high suspicion of rickettsiosis mainly scrub typhus. Scrub typhus prevails among southern Asia, western Pacific Islands, and northern Australian regions. These specific geographical region is usually known as the "tsutsugamushi triangle," with some one billion residents[2].

Rickettsioses have been listed as a class four inform malady in Taiwan since 1955. *O. tsutsugamushi* is propagated by transovarial transmission among trombiculid mites. when hatching, infected larval mites (chiggers) inoculate organisms under the skin. Infected chiggers square measure doubtless to be found in areas of serious scrub vegetation throughout the wet season, once mites lay eggs[3]. The epidemiologic transmission period from environmental exposure to mites in endemic region ranges from 6-21 days. The incidence of scrub typhus in India ranges between 4%-46%. However, the identification of eschars in Indian population is tough because of dark skin. The case-fatality rate for untreated scrub typhus cases is reported upto 7% among various studies[4]. Immunity lasts upto 1-3 years, despite of varied antigenic diversity of pathogen[5].

A severe case of rickettsiosis is classified as presence of shock (septic or hypovolemic), acute respiratory failure, acute renal failure, acute gastrointestinal bleeding, rhabdomyolysis, meningoencephalitis, myocarditis and death[6]. Severe cases usually manifest with interstitial

pneumonia and encephalitis because of vascular injury. Neurological manifestations occurred due involvement of central nervous system and most common manifestations are meningoencephalitis and meningitis. The incidence of neurological manifestations ranges from 15%-50% patients with scrub typhus among various studies[7].

Common symptoms are usually fever, headache, weakness, myalgia, nausea, vomiting, cough, and gastrointestinal symptoms. Clinical identification is usually made by the presence of associated scab and clinical improvement following antibiotic therapy[8]. The associated clinical laboratory findings with cases of scrub typhus are mild leukopenia, thrombocytopenia, lymphocytosis, elevations of hepatic aminotransferases and hyponatremia[9]. The present study was conducted to assess and evaluate the liver function test among patients of scrub typhus fever admitted in our tertiary care hospital.

Materials & Methods

The present cross-sectional study was conducted at department of general medicine of our tertiary care hospital. The study duration was of two years from January 2018 to December 2019. A sample size of 200 was calculated at 90% confidence interval at 5% acceptable margin of error by epi info software version 7.2. Patients who had scrub typhus IgM antibody positive were enrolled from outdoor and from ward by simple random sampling. Clearance from Institutional Ethics Committee was taken before start of study. Written informed consent was taken from each study participant.

Patients who had malarial diseases, dengue, typhoid or patients with existing liver disease were excluded from the present study. The data were collected by detailed history, general physical and clinical examination from each patient (more than

15 years of age) after taking the written consent. All study participants were subjected for routine blood investigation for complete blood count and liver function test and ELISA for scrub typhus serology. All the data was recorded on Microsoft excel spread sheet and data analysis was done at 10% alpha and 90% confidence interval using SPSS v22 software. Test of significance were applied on collected and organized data and p value less than 0.05 was considered as statistically significant association between study variables.

Results

In the present study we enrolled 200 patients who were aged from 17 to 61 years. The mean age of the enrolled patient was 36.42 ± 5.26 years. There was no patient in the present study who aged less than 15 years of age. Out of total patients diagnosed scrub typhus IgM antibody positive 59% were male and 41% were females. All of

these patients with scrub typhus fever were subjected for routine blood investigation for complete blood count and liver function test and ELISA for scrub typhus serology.

Among the total study participants 42 (21%) had normal serum ALT levels, 52 (26%) patients had serum ALT levels raised less than Two-folds, 48 (24%) patients had serum ALT levels raised more than Two-folds, 42 (21%) patients had serum ALT levels raised more than four-folds and 16 (8%) patients had serum ALT levels raised more than ten folds. Among the total study participants 30 (15%) had normal serum AST levels, 52 (26%) patients had serum AST levels raised less than Two-folds, 56 (28%) patients had serum AST levels raised more than Two-folds, 50 (25%) patients had serum AST levels raised more than four-folds and 12 (6%) patients had serum AST levels raised more than ten folds. (Table 1)

Table 1: Distribution of study participants according to range of aminotransferase elevations in scrub typhus fever.

	ALT (%)	AST (%)
Normal	42 (21%)	30 (15%)
<Two-fold rise	52 (26%)	52 (26%)
Two-four-fold rise	48 (24%)	56 (28%)
Four-tenfold rise	42 (21%)	50 (25%)
>Tenfold rise	16 (8%)	12 (6%)

In the present study, out of total 200 study participants, on the assessment of liver function it was found that, 28 (14%) patients had bilirubin levels raised more than two folds, 62 (31%) patients had raised alkaline phosphatase levels and 30 (15%) patients had raised serum globulins levels. out of total 200 study participants, 118

(59%) patients had normal serum proteins levels and 82 (41%) patients had serum proteins levels below normal range. out of total 200 study participants, 116 (58%) patients had normal serum albumin levels and 84 (42%) patients had serum albumin levels below normal range. (Table 2)

Table 2: Distribution of study participants according to ranges of increased bilirubin, alkaline phosphatase and globulin levels.

Tests		Number of patients (%)
Liver function test parameters	Bilirubin > 2mg/dl	28 (14%)
	Alkaline phosphatase increased	62 (31%)
	Serum globulins increased	30 (15%)
Serum proteins	Low	82 (41%)
	Normal	118 (59%)

	Increased	(0%)
Serum albumin	Low	84 (42%)
	Normal	116 (58%)
	Increased	(0%)

Discussion

In the present study we enrolled 200 patients who were aged from 17 to 61 years. The mean age of the enrolled patient was 36.42 ± 5.26 years. There was no patient in the present study who aged less than 15 years of age. Out of total patients diagnosed scrub typhus IgM antibody positive 59% were male and 41% were females. All of these patients with scrub typhus fever were subjected for routine blood investigation for complete blood count and liver function test and ELISA for scrub typhus serology. Among the total study participants 42 (21%) had normal serum ALT levels, 52 (26%) patients had serum ALT levels raised less than Two-folds, 48 (24%) patients had serum ALT levels raised more than Two-folds, 42 (21%) patients had serum ALT levels raised more than four-folds and 16 (8%) patients had serum ALT levels raised more than ten folds. Similar results were obtained in a study conducted by Kausik M et al among patients of scrub typhus fever and found that effects of scrub typhus virus infection associated with effects on liver function test and histopathological patterns are suggestive of councilman bodies, micro vascular steatosis and liver cell necrosis[10]. In previous researches, it was reported that scrub typhus infection has affect the liver and the liver functions were disarranged. However, liver functions are not deteriorated in the early phases of scrub typhus fever. The etiology behind this deterioration was multifactorial because of direct injury or hypoxic injury or immune mediated damage[11].

In the present study, among the total study participants 30 (15%) had normal serum AST levels, 52 (26%) patients had serum AST levels raised less than Two-folds, 56 (28%) patients had serum AST levels raised more than Two-folds, 50 (25%) patients

had serum AST levels raised more than four-folds and 12 (6%) patients had serum AST levels raised more than ten folds. Similar results were obtained in a study conducted by Narendra R et al among patients of scrub typhus fever and on the assessment of liver function test disturbance in test values was reported. Clinically patients were presented with hepatomegaly, jaundice and right hypochondrium pain[12]. Similar results were obtained in a study conducted by Dong-Min K et al among patients of scrub typhus fever and found that 46% patients had < 3-fold rise in AST, 37% patients had 3-10-fold rise in AST and 17% patients had > 10-fold rise in AST levels. 28% patients had 1-3-fold rise in ALT, 60% patients had 3-10-fold rise in ALT and 9% patients had > 10-fold rise in ALT levels. They found AST elevation was more statistically significant than ALT[7].

In the present study, out of total 200 study participants, on the assessment of liver function it was found that, 28 (14%) patients had bilirubin levels raised more than two folds, 62 (31%) patients had raised alkaline phosphatase levels and 30 (15%) patients had raised serum globulins levels. out of total 200 study participants, 118 (59%) patients had normal serum proteins levels and 82 (41%) patients had serum proteins levels below normal range. out of total 200 study participants, 116 (58%) patients had normal serum albumin levels and 84 (42%) patients had serum albumin levels below normal range. Similar results were obtained in a study conducted by Channabasavaraj H et al among patients of scrub typhus fever and found that 70 % patients had low total patients serum proteins and 71% of patients had shown hypoalbuminemia[13]. Similar results were obtained in a study conducted by E Mathai et al among patients of scrub typhus fever

and found that 30% patients had serum alkaline phosphatase levels raised than normal[14]. Similar results were obtained in a study conducted by U K Misra et al among patients of scrub typhus fever and found that 5% patients had serum bilirubin levels raised more than two folds than normal[15].

Conclusion

We concluded from the present study that liver function test deterioration among scrub typhus fever was varied from normal range of biochemical markers to raised liver function markers. AST elevation was observed more statistically significant than ALT elevation. Hyperbilirubinemia and raised alkaline phosphatase levels were also observed. Low serum albumin levels were associated with the critical phase of the liver disease.

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