

Research Article

A gender based comparative analysis of laboratory investigations in scrub typhus patients at tertiary care teaching hospital of Southern Rajasthan, India

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ABSTRACT

Background: Scrub typhus is an acute febrile infectious disease which is common in both male and female patients. This study was done to compare the laboratory tests of the scrub typhus patients with reference to sex.

Methods: This retrospectively study was carried out in diagnosed scrub typhus patients who were admitted to intensive care unit of a tertiary care teaching hospital of Southern Rajasthan. Diagnosis was done by testing for specific IgM antibodies against *Orientia tsutsugamushi* using a commercial ELISA kit.

Results: Out of total 72 undiagnosed acute febrile illness patients, 26 (36.11%) were diagnosed as scrub typhus. Mean age of the patients was 39.5±12.1. There were 12 (46.15%) males and 14 (53.5%) females. Out of all 26 patients, 3 (11.54%) patients died. All laboratory tests were having non-significant difference between male and female values except haemoglobin, platelets count, serum Na and alkaline phosphatase. Raised creatinine, SGOT, SGPT and decreased albumin was found in all patients. Thrombocytopenia was found in all 12 males (100%) and 11 females (78.57%). Raised bilirubin level was found more in males (10, 83.33%) as compared to females (5, 35.71%) which were statistically significant. Raised alkaline phosphatase level was found more in female (12, 85.71%) as compared to male (5, 50%) which was also significant.

Conclusions: Scrub typhus should be considered in differential diagnosis for both male and female acute febrile illness patients due to its non-significant difference in their laboratory values.

Keywords: Acute febrile illness, Scrub typhus, *Orientia tsutsugamushi*, ELISA, Laboratory tests

INTRODUCTION

Scrub typhus is an acute febrile zoonotic infectious disease that is caused by bacteria, *Orientia tsutsugamushi*. It is transmitted to humans and rodents by some species of trombiculid mites.¹ The seasonal occurrence of scrub typhus varies with the climate in different countries. The period of epidemic is influenced by the activities of the infected mite. It occurs more frequently during the rainy season. It is grossly under-diagnosed in India due to its non-specific clinical presentation, limited awareness, low index of suspicion

among clinicians, and lack of diagnostic facilities. Scrub typhus is more common in farmers, labourers and those exposed to soil. It is characterized by a typical primary necrotic lesion (eschar), generalized lymphadenopathy, rash, and non-specific symptoms such as fever, headache, myalgia and cough.² Severe complications include prominent encephalitis, interstitial pneumonia, acute respiratory distress, myocarditis, pericarditis, cardiac arrhythmia, acute renal failure, acute hepatic failure, and acute hearing loss. Acute respiratory distress syndrome (ARDS) is a serious complication of scrub typhus.³

In India, scrub typhus has been reported from many states including Tamil Nadu, Himachal Pradesh, Jammu, Pondicherry, Andhra Pradesh, Kerala and Meghalaya, among others⁴⁻¹⁰. More recent studies have highlighted that scrub typhus is an important cause of acute undiagnosed febrile illness in India. Different types of samples are used to collect for laboratory investigation. Very few studies were conducted in Rajasthan and we could not find any study on literature search which compare male and female laboratory results. So this retrospective study was planned to compare the laboratory tests of the scrub typhus patients with reference to sex.

METHODS

This retrospectively study was carried out in patients who were admitted to intensive care unit of a tertiary care teaching hospital of southern Rajasthan. After taking the permission from institutional ethics committee, medical records of all the undiagnosed acute febrile illness patients were analysed who were admitted during rainy season and only diagnosed patients of scrub typhus were included in study. All other patients which were diagnosed as malaria, leptospirosis, dengue fever, viral infections, enteric fever, urinary tract infection were excluded. Diagnosis was on the basis of clinical features,

it was further confirmed by testing for specific IgM antibodies against *O. tsutsugamushi* using a commercial ELISA kit.

Laboratory data were analysed for all the diagnosed patients. Haemoglobin, blood counts, serum chemistry including blood sugar, serum creatinine, bilirubin, albumin, SGOT/SGPT, creatinine and electrolytes were analysed. Chest radiograph and ECG were also obtained. All the diagnosed patients of scrub typhus were given doxycycline and the patients who showed inadequate response were given azithromycin also.

All the data were in Mean \pm SD. Suitable statistical tests like unpaired 'student t' test and chi square test were used to compare the data wherever applicable.

RESULTS

Total 72 patients of undiagnosed acute febrile illness were admitted in ICU from September to November 2015. Out of these 72 patients, 26 (36.11%) were diagnosed as scrub typhus with the ELISA Kit. Mean age of the patients was 39.5 \pm 12.1. There were 12 (46.15%) males and 14 (53.5%) females. Average duration of ICU stay was 8.69 \pm 3.66. Out of all 26 patients, 3 (11.54%) patients died.

Table 1: Laboratory results in scrub typhus patients with respect to gender.

Laboratory investigations	Total patients (n=26)	Male (n=12) Age=39.51 \pm 4.95	Female (n=14) Age=39.5 \pm 9.62	P value
Haemoglobin (g/dl)	10.92 \pm 1.90	11.78 \pm 1.75	10.18 \pm 1.77	0.03*
Total leucocyte count (/ μ l)	7610 \pm 3613.9	7250.83 \pm 4477.16	7917.86 \pm 2816.74	0.65
Platelets (mm ³)	75384.7 \pm 68644.6	46750 \pm 23347.67	99928.57 \pm 84822.41	0.04*
Random blood sugar (mg/dl)	108 \pm 30.81	104.42 \pm 28.53	113.57 \pm 32.60	0.46
Blood urea (mg/dl)	87.48 \pm 71.36	106.75 \pm 93.97	70.97 \pm 41.05	0.21
Serum creatinine	1.81 \pm 1.56	2.4 \pm 1.83	1.3 \pm 1.11	0.07
Na (mmol/l)	130.9 \pm 7.96	127.59 \pm 6.22	133.76 \pm 8.37	0.05*
K (mmol/l)	3.89 \pm 2.18	3.69 \pm 0.96	4.07 \pm 2.88	0.67
Serum bilirubin (mg/dl)	3.14 \pm 2.83	4.24 \pm 2.87	2.2 \pm 2.52	0.07
SGOT (IU/l)	253.31 \pm 176.45	303.42 \pm 121.28	210.36 \pm 207.67	0.19
SGPT (IU/l)	127.81 \pm 74.18	121.33 \pm 55.19	133.36 \pm 89.06	0.69
Alkaline phosphatase(IU/l)	228.75 \pm 149.13	158.5 \pm 70.36	278.93 \pm 171.50	0.03*
Total protein (g/dl)	5.32 \pm 0.69	5.25 \pm 0.67	5.39 \pm 0.72	0.62
Albumin (g/dl)	2.19 \pm 0.37	2.22 \pm 0.47	2.17 \pm 0.28	0.74
Globulin (g/dl)	3.15 \pm 0.51	3.04 \pm 0.39	3.24 \pm 0.60	0.33
PT (sec)	17.3 \pm 3.39	17.88 \pm 3.30	16.81 \pm 3.50	0.43
aPTT (sec)	42.74 \pm 22.71	48.24 \pm 28.54	36.7 \pm 9.96	0.18
INR ratio	1.33 \pm 0.40	1.47 \pm 0.47	1.22 \pm 0.30	0.11
Ca (mg/dl)	7.05 \pm 0.7	7.01 \pm 0.67	7.09 \pm 0.76	0.78
Mg (mmol/l)	2.53 \pm 0.54	2.62 \pm 0.59	2.44 \pm 0.49	0.4
Phosphate (mg/dl)	3.48 \pm 1.96	4 \pm 2.75	3.01 \pm 0.54	0.2
Pao2/ FiO ₂ ratio	258.6 \pm 80.95	259.55 \pm 48.76	257.86 \pm 101.33	0.96

*p \leq 0.05 shows significant difference.

Table 1 shows laboratory results of total 26 patients and comparison between male and female laboratory data. All laboratory tests were having non-significant difference between male and female values except haemoglobin, platelets count, serum Na and alkaline phosphatase which were having significant difference.

Figure 1 shows raised creatinine, SGOT, SGPT and decreased albumin in all 12 male (100%) and all 14 female (100%). Thrombocytopenia was found in all 12 male (100%) and 11 female (78.57%). Raised bilirubin level was found more in male (10, 83.33%) as compared to female (5, 35.71%) which was statistically significant. Raised alkaline phosphatase level was found more in female (12, 85.71%) as compared to male (5, 50%) which was also significant.

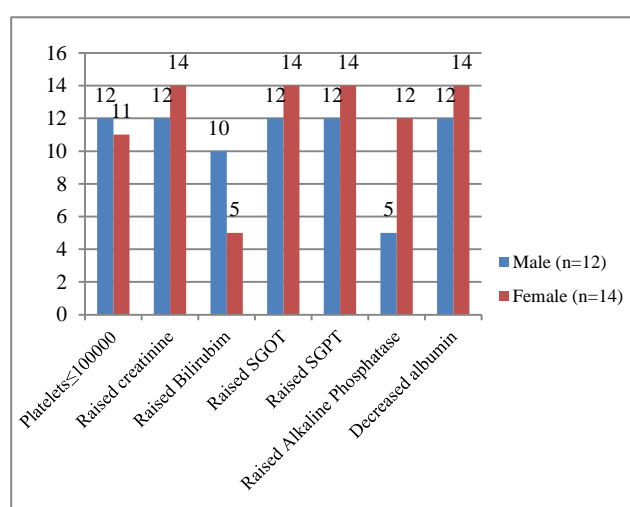


Figure 1: Important parameters altered in scrub typhus patients with respect to gender.

DISCUSSION

Early diagnosis is very much important in case of scrub typhus patients because there is usually an excellent response to anti-microbial therapy. In developing countries with limited diagnostic facilities, it is prudent to recommend empiric therapy in patients with undifferentiated febrile illness having evidence of multiple system involvement. If a combination of elevated liver enzymes levels, thrombocytopenia and leukocytosis is used, the specificity and positive predictive value for diagnosis of scrub typhus are about 80%.¹¹ We tried to analyse the laboratory data of both male and female patients.

In our study total 26 (36.11%) were diagnosed with the ELISA as scrub typhus with no significance difference between male and female patients. Similar results were shown by study done in Thailand.¹² One study has shown incidence of 30.88% with male preponderance but with more incidence in female after 30 year of age.¹³ Some study has shown female preponderance.^{7,14} The difference in our study could be because of most of the patients from

village and in Rajasthan, India both male and female are involved in farming and field work where exposure of scrub typhus is more.

In our study 3 (11.54%) deaths were reported out of 26 patients admitted in ICU. Similar mortality rates were reported by other studies too.^{3,14-17} Mortality has been reported from 0% to 30%. The reason for this much of range of mortality can be due to patient's age, region of infection, missed or delayed diagnosis etc.

In our study laboratory reports of both male and female have shown altered value but fall in platelets count (thrombocytopenia) was more significantly found in male as compared to female. More decreased Serum Na level was found more in male as compared to female. Serum alkaline phosphatase was found raised significantly more in female. All 26 diagnosed patients were having thrombocytopenia, elevated serum enzyme levels of SGOT, SGPT, alkaline phosphatase, decreased albumin and raised bilirubin and creatinine level which shows multiple organ involvement in case of scrub typhus. In our study PaO₂/FiO₂ ratio was also found in between 200-300 which shows ARDS means respiratory involvement. Similar reports of multiple organ involvement/failure have been reported by other studies too.^{7,18,19}

In our study SGOT and SGPT was elevated in all patients but alkaline phosphates was elevated in 65.38% of patients which was more in females. There have been several reports indicating a close relationship between elevated hepatic enzyme level and scrub typhus. In these studies these enzyme level were increased in 74.5-96.3% patients for SGOT 66.7-91.7% for SGPT, and 57.4-84.2% for alkaline phosphatase.²⁰⁻²²

CONCLUSION

Scrub typhus is common in both male and female patients with-out any significant difference in their laboratory data. So, among patients of acute febrile illness during rainy season it should be considered in differential diagnosis for both male and female patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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