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Acute kidney injury not uncommon: A relook into clinical spectrum of scrub typhus infection.

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Abstract

Introduction: Scrub typhus is a zoonosis caused by bacterium *Orientia tsutsugamushi,* which is transmitted to humans by the bite of larvae of trombiculid mite. Acute kidney injury in Scrub typhus is characterized by abrupt deterioration in kidney function which clinically manifests as a reversible acute increase in nitrogen waste products, measured by blood urea nitrogen and serum creatinine levels with or without reduced urine output over the course of hours to weeks.

Methods: The present study was a prospective observational study conducted on 60 adult patients of scrub typhus reported between July 2017 to December 2020 in medicine department at Pt. B. D. Sharma PGIMS Rohtak Haryana. A detailed history and clinical examination was done in all subjects included in the study. Patients who fulfilled case definition criteria were evaluated for AKI as per definitions of KDIGO classification on day of admission and then subsequently on day 3, 7 and 14 with laboratory investigations i.e. serum creatinine, blood urea, urine output and eGFR.

Results: Out of 60 scrub typhus cases 34 had AKI. Among these, 16 cases were in AKI stage I, 10 in AKI stage II and remaining 8 were in AKI stage III. 5 cases required urgent renal replacement therapy, rest improved with conservative management. Mortality was 13.33 % within first month.

Conclusion: Scrub typhus is one of the most important cause in patients of acute febrile illness presenting with thrombocytopenia, shock, renal dysfunction, ARDS and multiorgan failure. Measures avoiding exposure to infected mites and in infected patients early diagnosis and treatment should be targeted to prevent the development of fatal complications. Early diagnosis and early management of AKI is important to improve the outcomes of scrub typhus patients.

Keywords: Acute kidney injury, Tropical fever, Acute respiratory distress syndrome.

Introduction

Scrub typhus is a zoonosis caused by bacterium Orientia tsutsugamushi, which is transmitted to humans by the bite of larvae of trombiculid mite. Its distribution was initially limited to a triangular area (the tsutsugamushi triangle) bordered by Japan, eastern Australia and eastern Russia, which includes India (sub-Himalayan and southern India) and China.[1]

This disease which is mostly seen during and after the rainy season, mainly affects people who work outside and are exposed to shrub sand vegetation, on which the vector thrives.[2] The recent increase in reports of scrub typhus cases from the Indian Subcontinent highlight the changing epidemiology of this disease.[3] Though it is likely that a part of it may be related to improved diagnostic techniques that were not previously available in these regions, but reports from urban regions and finding of new vector highlight the evolution of disease transmission.[4]

The most recent data especially from the Indian Subcontinent has shown that AKI is seen in 30-60% of patients treated at tertiary care referral centers. If asymptomatic urinary abnormalities are taken into account, renal abnormalities can be seen in up to 80% patients.[5] Injury to vascular endothelium, tubules and interstitial inflammation are main mechanisms of renal involvement.

The two most commonly used drugs to treat this disease are doxycycline and azithromycin.[3] Therefore, in areas of high endemicity, doxycycline is frequently used as an empirical therapy to cover for scrub typhus.[2] Though AKI has been shown to be a predictor of mortality in these patients, other organ dysfunction are frequently associated with poorer prognosis.

Acute kidney injury in Scrub typhus is characterized by abrupt deterioration in kidney function which clinically manifests as a reversible acute increase in nitrogen waste products, measured by blood urea nitrogen and serum creatinine levels with or without reduced urine output over the course of hours to weeks. These can either be related to direct involvement of the kidneys and urinary tract via tubulointerstitial toxicity and injury to glomerular endothelium or indirect consequence of systemic effects of infection i.e., hemolysis, rhabdomyolysis, hypovolemic shock, septic shock and immune complex deposition in glomeruli[6]. AKI has various epidemiological and clinical patterns in tropical countries with different climates and socioeconomic features and, therefore, needs improved individualized approaches in these different regions.

Materials and Methods

This was a prospective observational study conducted on 60 adult patients aged more than 18 years diagnosed with scrub typhus between July 2017 to December 2020 in medicine department at Pt. B. D. Sharma, PGIMS Rohtak, Haryana. Patients aged less than 18 years or more than 75 years, patients having nosocomial infections, chronic infections, fever due to non infectious etiologies were excluded from the study. Patients of chronic kidney disease, acute kidney injury secondary to non infectious etiologies, urosepsis, lower respiratory tract infections, hematological malignancies, immunocompromised or immunosuppressed individuals and pregnant females were also excluded from the study. All patients were evaluated by a set of routine blood and urine investigations, IgM Scrub typhus by ELISA, chest radiograph, ECG, 2-D ECHO, abdominal ultrasonogram and arterial blood gas.

KDIGO guidelines were used for AKI diagnosis and classification.[7] Scrub typhus was considered in patients who had clinically manifestations suggestive of Scrub typhus positive for IgM antibodies. All patients were evaluated for AKI on day of admission and then subsequently on day 3, 7 and 14 with laboratory investigations i.e. serum creatinine, blood urea, urine output and eGFR.[8]

Our study is limited to the district of Haryana, represented by dry plains and semi-desert area with minimal annual rainfall; geographically unlikeliest area to scrub typhus. Although, the diagnosis of scrub typhus occupied the lowest rank among all the differentials of acute febrile illness, it was considered since patients clinical

presentation was classical with rickettsiosis, and all the tests run to identify the most commonly prevalent etiological agents were negative.

Statistical analysis:

AKI was considered as explanatory variable. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Categorical outcomes were compared between study groups using Chi square test/student's t test. The trend of laboratory values from admission to final follow up, at different time intervals was assessed by comparing the mean values, using one-way repeated measures ANOVA. Data were analyzed and statistically evaluated using SPSS 22.0 software.[9]

Results

The present study included 60 adult patients of scrub typhus. The mean age was 37.9 ± 12.01 years. Minimum age was 18 years and maximum was 62 years. Among the study population 36 people were males and remaining 24 were females. Baseline and follow up Haematological and Renal parameters in Scrub typhus patients (60) are shown table 1.

Table1: Baseline and follow up Haematological and Renal parameters in Scrub typhus patients (N=60)

	Baseline	Day 3 follow up	Day 7 follow up	Day 14 follow up	P*value
Hemoglobin (g/dl)	11.44 ± 2.2	10.42 ± 1.5	11.98 ± 1.7	11.44 ± 1.4	0.09
Total Leucocytes Count	7928± 3789.33	6791 ± 2178.83	6054± 1569.05	6498 ± 1096	0.08
Absolute Platelets Count	69910±50408.19	100480 ± 44534.25	158990±30417.57	260200± 46233.49	<0.001
Blood urea(mg/dl)	70.59 ± 57.80	55.49 ± 42.55	40.37 ± 25	19.42 ± 14.3	<0.001
Serum creatinine (mg/dl)	1.62 ± 1.38	1.45 ± 1.25	1.07 ± 0.80	0.89 ± 0.44	<0.001
Corrected Serum Calcium(mg/dl)	9.21 ± 0.50	9.14 ± 0.36	8.86 ± 0.33	9.20 ± 0.26	0.19
Serum phosphate (mg/dl)	4.9 ± 0.38	3.9 ± 0.42	3.8 ± 0.41	3.4 ± 0.38	0.08
Serum Uric Acid (mg/dl)	4.8 ± 1.09	3.55 ± 1.14	3.39 ± 0.75	2.84 ± 0.71	0.10
Serum Protein (g/dl)	7.34 ± 0.29	7.22 ± 0.25	7.11 ± 0.25	7.08 ± 0.32	0.11
Serum Albumin (g/dl)	2.99 ± 0.24	3.21 ± 0.22	3.59 ± 0.17	3.59 ± 0.21	0.07
Serum bilirubin (mg/dl)	4.8 ± 3.1	3.9 ±2.1	3.5 ± 1.5	3.0 ± 1.1	0.05
SGOT(u/L)	110 ± 35	89± 45	65±30	55±37	0.06
SGPT (U/L)	90±32	80±22	69±36	50± 36	0.07
Serum sodium (meq/l)	141.35 ± 2.99	138.45 ± 2.14	137.22 ± 2.84	140.79 ± 3.39	0.13
Serum Potassium (meq/l)	3.23 ± 0.34	3.71 ± 0.35	3.68 ± 0.37	3.79 ± 0.31	0.16
Urine Output (ml)	906.3 ± 443.89	1007.8 ± 425.58	1201.5 ± 335.48	1574.5 ± 307.95	<0.001
eGFR (ml/min/1.73m^2)	60.66 ± 43.22	82.53 ± 43.64	89.94 ± 43.61	97.94 ± 40.22	<0.001

Repeated ANOVA test*

Most common clinical manifestation was fever which was present in 90% of patients which ranged from a duration of 5-10 days, low to high grade and was associated with chills and rigor in majority of them. 40% of the patients presented with hypotension, 20 of whom required inotropic support. A maculopapular rash was seen in 25% patients mostly on face and trunk. Eschar was found in only in 10% of the patients predominantly over lower limbs. Among the biochemical parameters, abnormal LFTs in the form of elevated transaminases were seen in 80% of patients. Anemia in 12(20%), leukocytosis in 15 (25%) and thrombocytopenia in 40 (67%). Proteinuria when assessed by dip stick was found in 39 (66%) of patients. 24(40%) of patients had abnormal chest X-ray which revealed bilateral diffuse parenchymal infiltrate, ground glass opacities, bilateral reticulonodular opacities, septal lines, consolidation, hilar lymphadenopathy and pleural effusion. (as given in table 2)

Out of 60 patients, 25 patients having Acute respiratory distress syndrome and 20 having multiorgan failure. Out of 25 having Acute respiratory distress syndrome, 15 patients required high flow oxygen and BIPAP, remaining 10 required mechanical ventilator.(as given in table 2).

Table 2: Clinical Features of Patients with Scrub Typhus (n=60)

Signs and Symptoms	Number(%)	Signs and Symptoms	Number (%)
Fever (>100°F)	**54(90%)**	Crackles	**24(40%)**
Myalgia	**36(60%)**	Rash (maculopapular)	**15(25%)**
Headache	**30(50%)**	Lymphadenopathy	**12(20%)**
Nausea and vomiting	**30(50%)**	Breathlessness	**29(48%)**
Altered sensorium	**4(6.7%)**	Pleural effusion	**6(10%)**
Abdominal pain	**27(45%)**	Eschar	**6(10%)**
Systolic blood pressure <90 mm hg	**24(40%)**	Diarrhea	**8(24%)**
Hepatomegaly	**21(35%)**	Icterus	**12(20%)**
Splenomegaly	**20(33%)**	Ventilator requirement	**10(16.7%)**
Acute kidney injury	**34(57%)**	Deranged liver function	**48(80%)**
Oligouria	**20(33%)**	Death	**48(%)**
Renal replacement therapy	**5(8.3%)**	Anemia	**12(20%)**
Ecg changes	**3(5%)**	Myocardiatitis	**3(5%)**
Lukocytosis	**15(25%)**	Proteinuria	**39(66%)**
Thrombocytopenia	**40(67%)**	Acute respiratory distress syndrome	**25(41%)**
Multiorgan failure	**20(33%)**	Death	**8(13.3%)**

Baseline and follow up Haematological and Renal parameters in Scrub typhus patients with acute kidney injury (34) are shown table 3. 34 out of total 60 patients had acute kidney injury. Among these, 16 cases were in AKI stage I, 10 in AKI stage II and remaining 8 cases were in AKI stage III.

Table 3: Baseline and follow up Haematological and Renal parameters in Scrub typhus patients with acute kidney injury (N=34)

	Baseline	Day 3 follow up	Day 7 follow up	Day 14 follow up	P*value
Hemoglobin (g/dl)	10.44 ± 2.2	9.42 ± 15	10.98 ± 1.7	10.44 ± 1.4	0.07
Total Leucocytes Count	9928± 3899.33	8791 ± 2338.83	6054± 1229.05	6498 ± 1336.11	0.08
Absolute Platelets Count	60710±10408.19	90480 ± 30534.25	128990±20417.57	160200± 16233.49	<0.001
Blood urea(mg/dl)	90.59 ± 57.80	75.49 ± 42.55	50.37 ± 25	39.42 ± 14.3	<0.001
Serum creatinine (mg/dl)	3.62 ± 1.38	3.35 ± 1.25	2.47 ± 0.80	1.89 ± 0.44	<0.001
Corrected Serum Calcium (mg/dl)	9.11 ± 0.50	9.24 ± 0.36	8.99 ± 0.33	9.20 ± 0.26	0.14
Serum phosphate (mg/dl)	5.9 ± 0.38	4.9 ± 0.42	3.8 ± 0.71	3.4 ± 0.33	0.08
Serum Uric Acid (mg/dl)	5.8 ± 1.09	4.55 ± 1.14	3.39 ± 0.75	2.84 ± 0.71	0.09
Serum Protein (g/dl)	7.44 ± 0.29	7.22 ± 0.25	7.12 ± 0.25	7.08 ± 0.31	0.11
Serum Albumin (g/dl)	2.79 ± 0.24	3.11 ± 0.22	3.39 ± 0.17	3.59 ± 0.21	0.07
Serum bilirubin (mg/dl)	7.8 ± 3.1	6.9 ±2.1	4.5 ± 1.5	3.9 ± 1.1	0.05
SGOT(u/L)	130 ± 35	99± 23	75±20	65±17	0.04
SGPT (U/L)	126 ± 39	100 ± 22	89±26	80± 16	0.05
Serum sodium (meq/l)	141.35 ± 2.99	140.45 ± 2.14	138.22 ± 2.84	138.79 ± 3.39	0.12
Serum Potassium (meq/l)	3.33 ± 0.34	3.81 ± 0.35	3.78 ± 0.37	3.79 ± 0.31	0.19
U rine Output (ml)	606.3 ± 403.89	807.8 ± 325.58	1001.5 ± 335.48	1174.5 ± 307.95	<0.001
eGFR (ml/min/1.73m^2)	40.66 ± 23.22	52.53 ± 13.64	69.94 ± 13.61	77.94 ± 20.22	<0.001

Repeated ANOVA test*

5 cases required urgent renal replacement therapy; rest improved with conservative management like maintaining hydration, ionotropic support, avoiding nephrotoxic drugs. Overall mortality was 13.33 % within the first month.(as given in table 4). Baseline and follow up Haematological and Renal parameters in Scrub typhus patients with acute kidney injury having renal replacement therapy(5) are shown table 5.

Table 4: AKI staging in AKI associated Scrub typhus **patients (N=34)**

Scrub typhus	AKI staging	**I**	**II**	**III**	**DIALYSIS**
60	**34**	**16**	**10**	**8**	**5**

Repeated ANOVA test*

Table 5: Baseline and follow up Haematological and Renal parameters in Scrub typhus patients with acute kidney injury having renal replacement therapy on follow up (N=5)

	Baseline	**Day 3 follow up**	**Day 7 follow up**	**Day 14 follow up**	**P*value**
Hemoglobin (g/dl)	9.44 ± 2.2	10.42 ± 1.5	10.98 ± 1.7	10.44 ± 1.4	0.08
Total Leucocytes Count	10928± 3889.33	7791 ± 2178.83	7054± 1569.05	7498 ± 996	0.08
Absolute Platelets Count	59910±20408.19	60480 ± 24534.25	128990±30417.57	160200± 36233.49	<0.001
Blood urea(mg/dl)	190.59 ± 57.80	160.49 ± 42.55	140.37 ± 25.66	99.42 ± 14.3	<0.001
Serum creatinine (mg/dl)	7.62 ± 1.38	5.45 ± 1.25	4.07 ± 0.80	3.89 ± 0.44	<0.001
Corrected Serum Calcium (mg/dl)	9.22 ± 0.50	9.12 ± 0.36	9.06 ± 0.33	9.20 ± 0.26	0.18
Serum phosphate (mg/dl)	6.9 ± 0.38	5.9 ± 0.42	4.8 ± 0.41	3.4 ± 0.38	0.08
Serum Uric Acid (mg/dl)	7.8 ± 1.09	5.55 ± 1.14	4.39 ± 0.75	2.84 ± 0.71	0.10
Serum Protein (g/dl)	7.24 ± 0.29	7.21 ± 0.25	7.44 ± 0.25	7.18 ± 0.32	0.11
Serum Albumin (g/dl)	2.44 ± 0.24	3.11 ± 0.22	3.19 ± 0.17	3.59 ± 0.21	0.06
Serum bilirubin (mg/dl)	8.8 ± 3.1	6.9 ±2.1	5.5 ± 1.5	4.7 ± 1.1	0.05
SGOT(u/L)	130 ± 35	109± 45	95±20	75±17	0.04
SGPT (U/L)	110 ± 32	90±22	89±36	70± 16	0.04
Serum sodium (meq/l)	140.35 ± 2.99	139.45 ± 2.14	137.22 ± 2.84	140.79 ± 3.39	0.12
Serum Potassium (meq/l)	5.13 ± 0.34	4.71 ± 0.35	4.68 ± 0.37	3.79 ± 0.31	0.08
Urine Output (ml)	206.3 ± 143.89	307.8 ± 125.58	501.5 ± 335.48	674.5 ± 307.95	<0.001
eGFR (ml/min/1.73m^2)	23.66 ± 13.22	32.53 ± 13.64	49.94 ± 13.61	57.94 ± 10.22	<0.001

Repeated ANOVA test

Out of 60 patients, 8 patients did not respond and died in early course. Among these, the most of patients presented with acute respiratory distress syndrome with multiorgan failure with shock. One patient presented with acute respiratory distress syndrome with multiorgan failure with shock with anuria received continuous renal replacement therapy and ventilator support, did not respond and died.

The mean duration of hospital stay (Days) in people with AKI was 15.75 ± 5.58, as compared to8.88± 0.76 for people without AKI and difference was statistically significant (P value <0.001). The important predictors of acute kidney injury were Age**,** SpO2 on admission, Temperature, Hemoglobin, total leucocytes count, neutrophils, lymphocytes, absolute platelets count, jaundice, transaminitis, oligiuria, systolic blood pressure and hospital stay. (as given in table 6)

Out of 5 patients having renal replacement therapy, one died, in 2 patients acute kidney injury was improved and 2 lost follow up.

Table 6: Predictive factors associated with AKI (N=60)

Parameter		**AKI**	***P value**
	Present (N=34)	Absent (N=26)	
	Mean ± SD	Mean ± SD	
Age (Years)	39.88 ± 13.67	34.56 ± 12.09	*0.007*
Gender			**#P value**
Male	20 (58.82%)	16 (61.54%)	0.534
Female	14 (41.18%)	10 (38.46%)	
Diagnosis			**#P value**
Scrub typhus	34 (56.66%)	26 (43.33%)	<0.001
Physical examination parameters			
Parameter	Mean ± SD	Mean ± SD	***P value**
Systolic BP(mm Hg)	111.88 ± 7.92	118.85 ± 5.01	*0.435*
Diastolic BP(mm Hg)	63.94 ± 6.53	70.74 ± 7.25	*0.145*
Pulse rate(per min.)	96.56 ± 10.05	80.06 ± 8.62	*0.324*
SPO_2(%)	93.03 ± 2.1	94.47 ± 1.2	*<0.001*
Temperature(ºF)	103.65 ± 0.83	102.92 ± 1.1	*<0.001*

Biochemical parameters

Parameter	Mean ± SD	Mean ± SD	***P value**
Hemoglobin (g/dl)	11.57 ± 2.8	12.91 ± 1.81	*0.005*
Total Leucocytes Count (per mm^3)	10015.63 ± 5322.75	7075 ± 1188.42	*<0.001*
Neutrophils(per mm^3)	78.47 ± 10.85	70.93 ± 7.62	*<0.001*
Lymphocytes(per mm^3)	18.47 ± 10.16	24.1 ± 7.18	*<0.001*
Absolute Platelets Count(per mm^3)	99444.44 ± 59298.68	99852.94 ± 56484.38	*0.014*

Parameter	Mean ± SD	Mean ± SD	*P value
Blood urea (mg/dl)	100.97 ± 60.11	35.29 ± 3.17	*<0.001*
Blood sugar (mg/dl)	87.56 ± 11.6	92.22 ± 8.23	*0.410*
Serum creatinine (mg/dl)	2.79 ± 1.67	0.93± 0.11	*<0.001*
Corrected Serum Calcium (mg/dl)	9.15 ± 0.63	9.11± 0.47	*0.134*
Serum phosphate (mg/dl)	4.11 ± 0.43	3.41± 0.35	*0.109*
Serum Uric Acid (mg/dl)	3.93 ± 1.67	3.24± 0.62	*0.141*
Serum Protein (g/dl)	7.32 ± 0.31	7.12± 0.27	*0.110*
Serum Albumin (g/dl)	3.19 ± 0.29	3.37± 0.2	*0.064*
Serum bilirubin (mg/dl)	11.5 ± 3.1	9.5 ± 3.2	*<0.001*
SGOT(u/L)	130 ± 36	106 ± 3.1	*0.04*
SGPT (U/L)	126 ± 32	110 ± 35	*0.04*
Serum sodium (meq/l)	140.41 ± 3.71	144.32 ± 2.61	*0.898*
Serum Potassium (meq/l)	3.56 ± 0.5	3.86± 0.16	*0.142*
Urine Output (ml)	562.19 ± 354.5	1493.53 ± 233.48	*<0.001*
eGFR (ml/min/1.73m^2)	42.05 ± 23.31	107.94 ± 25.27	*<0.001*
Hospital stay (days)	15.75 ± 5.58	8.88± 0.76	*<0.001*

Discussion

Our study is limited to the district of Haryana, represented by dry plains and semi-desert area with minimal annual rainfall. In our present study, 60 % were male and 40% were female. 80% were agriculture workers and rest were others like teacher, clerk, shopkeeper etc.

Scrub typhus cases peak during in rainy season and in hilly areas with moisture and scrub vegetation, however it can also occur in diverse habitats like sea shore, rice fields and semi dessert area.[10] Ours being a dry area with scanty rainfall and vegetation not supportive of scrub typhus, however increased reporting of cases suggest other factors which might play a role in its epidemiology. The disease is known to occur in agricultural workers, with exposure to environmental factors including bushes, piles of wood, domestic animals and rodents significantly associated with illness. The maximum prevalence seen in farmers suggest that it is related to exposure to the mites in open fields rather than indoor occupation. A study in Japan reported that 44% of patients are engaged in farming.[11,12] A clean living-environment and control of rodents decreased the incidence of scrub typhus significantly among troops in China.[13] Moreover, during the post monsoon season farmers are involved in extensive field activities, increasing their exposure to chigger bites. This explains the large majority of ours patients (88%) presenting from the months of July to September. Post-monsoon surge in scrub typhus has been well-documented in literature.[14,15,16]

Myocarditis, an uncommon manifestation of scrub typhus, has been reported in few patients.[17]

5% of our patients who had non-specific ST-T wave changes on ECG and were diagnosed of myocarditis aided by echocardiography. Each of these patients presented with shock, which was characteristically non-responsive to fluid resuscitation and were eventually managed successfully with inotropic support apart from antibiotic therapy. Although the gold standard for diagnosing myocarditis is myocardial biopsy. Hypotension as a sign of myocarditis developed in the 2nd week of illness. Minor electrocardiogram (ECG) abnormalities such as nonspecific ST segment, T-wave changes and premature ventricular contractions have been reported in adults.[18,19] There are few reports of myocarditis caused by scrub typhus in the English literature.[20,21]

The present study showed that the proportion of AKI in scrub typhus was 56.67% and in a previous study conducted by Aggarwal HK et al. the proportion of AKI in scrub typhus was 40%. [22] In southern India the studies conducted by Basu G et al., Nair JJ et al. and Atkar CM et al., the prevalence of AKI in scrub typhus were 42.6% , 40% and 25% respectively which were lower than the proportion of AKI in scrub typhus in present study due to more critically ill patients of scrub typhus reporting to our institute which is a tertiary care centre.[23-25]

Basu G et al. conducted a study in a tertiary hospital in southern India with tropical acute febrile illness between January 2007 and January 2008 for the incidence and severity of The 367 patients (mean age 39.7 ± 16.9 years; 60% males) with tropical acute febrile illness due to scrub typhus (51.2%). 42.6% Scrub typhus having acute kidney injury, 5.9% patients required renal replacement therapy and 13.3% patients died.[23]

Nair JJ et al. studied 600 TAFI patients at a tertiary care centre in coastal Karnataka between September 2012 and September 2014 for the aetiology of TAFI; the development and staging of AKI based on Kidney disease: Improving global outcomes (KDIGO) guidelines; the initiation of RRT and in-hospital mortality. Out of 600 TAFI Patients, 5 patients were scrub typhus, out of these, 2 (40%) having AKI.[24]

Atkar CM et al. recruited 140 confirmed hospitalized cases of tropical acute febrile illnesses (TAFI) at a tertiary care institute in Maharashtra between October 2014 to November 2016 and studied the occurrence of AKI in TAFI by the RIFLE criteria as well as by their association with established diagnosis of tropical acute febrile illness. Out of 140 patients of TAFI, 16 patients were scrub typhus, 4 (25%) patients having AKI.[25]

Among AKI cases, the maximum patients were in AKI stage I and II. Only 8.33% cases required urgent urgent renal replacement therapy. The cause for severity were late diagnosis, involvement of other organs, comorbities condition like obesity, diabetes etc. and contraindication to treatment.

In our present study mortality rate was 13.33%. Most associated with acute kidney injury, ARDS and multiple organ failure which is similar to other.[26-29] kidney injury seen in tropical febrile illness is reversible if identified and managed timely. For this early diagnosis of primary infection and its treatment along with close watch for the high risk patients is very important. Mortality can be prevented in >95% of patients with targeted management strategies.

Conclusion

Scrub typhus forms one of the most differentials in patients of acute febrile ill ness presenting with thrombocytopenia, shock, abnormal renal dysfunction, ARDS and multiorgan dysfunction. The true epidemiological picture of AKI in the tropics is not well understood due to the late presentation of patients to tertiary centers. Measures avoiding direct contact with infected mites and reducing the time of contact of mites with the body coupled with early diagnosis and treatment should be considered to prevent the development of fatal complications. Early diagnosis and early management of AKI may help to improve the outcomes of scrub typhus patients in future.

Limitation of study: As this study was done at tertiary care level, the representation of more sick patients are likely in study group. Hence the finding cannot be generalized.

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