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Original Research Article

Acute renal failure in scrub typhus patients

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ABSTRACT

Scrub typhus, a bacterial infection caused by *Orientia tsutsugamushi* (formally *Rickettsia*) due to bite of the mite, and is increasing every year, and becomes a important cause of acute febrile illnesses. Due to lack of specific diagnostic facilities in most rural setups and non-specific clinical presentations, it becomes a challenge for clinician to correctly diagnose it on clinical examination. Clinically it presents with non-specific febrile illnesses with constitutional symptoms such as fever, rash, myalgia and headache or with organ dysfunction involving kidneys, lungs, liver, central nervous system or with circulatory collapse with hemorrhagic features. Eschar is the characteristic lesion which is present at the bite site of mite. Later an ulcer with black necrotic centre and regional lymphadenopathy occurs. Renal involvement in the form of Acute Renal Failure is seen very occasionally in these patients. So this Case-control study is designed for a period of six months which are october-2018 to march-2019, comparing 80 ELISA (Enzyme Linked Immune Sorbent Assay) confirmed cases of scrub typhus and 50 healthy controls. Statistically significant difference in Urea, Creatinine and Uric acid levels were found between two groups, using 't'-test with the significance value of $P < 0.0001$.

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1. Introduction

The word *Tsutsugamushi* says *Tsutsuga* means small and dangerous and *Mushi* means insect or mite. The disease Scrub Typhus says Scrub means vegetable and Typhus means fever with stupor or smoke. In Asian pacific region, Scrub Typhus is become a serious public health problem, including but not limited to Korea, Japan, China, Taiwan, India, Indonesia, Thailand, Srilanka, and Philippines. It affects about 1 million people each year.¹ It is caused by a arthropod born gram negative obligatory intracellular bacillus known as *Orientia tsutsugamushi*, and disease is also called *Tsutsugamushi* disease.² In India Scrub Typhus epidemic appeared in Assam and West Bengal during the

second world war. Afterward its presence was reported throughout India in trombiculid mite, humans and rodents.³ Rickettsiosis is generally believed to have disappeared from many parts of India, but recent reports from many parts including southern India indicates the resurgence of Scrub Typhus, and it is also reported endemic in northern and eastern India.⁴ The natural Reservoir of the Rickettsial infection is the adult mite from which the organism passes to larval stage by trans-ovarian transmission. Humans are the accidental host when they encroaches the mice affected areas, known as mite islands. After primary clearance of forests these secondary scrub grows and hence the term Scrub Typhus.⁵ After 5 to 14 days bitten by infected mite patient begins to exhibit manifestations of infection such as non specific flu like symptoms, fever, rash, eschar at the bite site, headache, myalgia, cough, generalized

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lymphadenopathy, nausea, vomiting and abdominal pain etc. Fever and Headache are most common symptoms in scrub typhus patients.⁶ Acute renal failure associated with Scrub Typhus infection is not so uncommon as previously thought. The possibility of Scrub Typhus should be born in mind when patient present with fever and varying degree of acute renal failure, particularly if eschar exist, along with the history of environmental exposure to endemic area.⁷ Scrub Typhus is a potentially fatal disease because of its complications which might leads to multi organ failure. The public health importance of this disease is underestimated because of that reason, it is difficult to clinically diagnose the scrub typhus, and lack of laboratory methods in many geographical areas. So a case-control study, which aids clinicians is planned to add Scrub Typhus in differential diagnosis of fever of unknown origin with non significant symptoms and few renal derangements.

2. Materials and Methods

A prospective, hospital based case-control study was conducted over a period of six months on patients attending the OPD and IPD of medicine department of Shri Guru Ram Rai Institute of Medical and Health Sciences and Shri Mahant Indires Hospital Dehradun from October 2018 to March 2019. 5ml blood sample was collected from the Scrub Typhus Positive patients in the serum separated tube (SST) in the Central Laboratory of SMI Hospital. Pregnant females, other confirmed causes of fever, children <5 years of age, Hypertension, Diabetes mellitus patients and other chronic illnesses were excluded. Gender and Age matched healthy controls were chosen to establish comparison. The serum samples were analyzed for the Urea,⁸ Creatinine⁹ and Uric Acid¹⁰ using VITROS 5600 fully auto-analyzer system of Ortho-Clinical Diagnostics. The results were compared with control group using unpaired 't'- test in SPSS version 20 and evaluated as (mean±SD±SE).

3. Results

Extremely significant difference with Blood urea (in mg/dl) levels 82.05±30.01 against the control group levels of 35.8±5.6 was established, and for Serum Creatinine (in mg/dl) 2.20±1.53 against the control group levels of 0.91±0.13 was established using unpaired 't'- test between renal parameters of scrub typhus patients and healthy individuals with 'p' value of <0.0001 which is extremely significant.

Results are described as mean ± SD ± SE below in the Table 1.

4. Discussion

Our study includes patients from rural sub-urban areas of the Northern India specifically from the Uttarakhand, Uttar pradesh, Haryana, Punjab and Himanchal Pradesh.

Table 1: Comparison of scrub typhus patients with healthy controls

Parameter	Cases (80) (mean±SD±SE)	Control (50) (mean±SD±SE)	't' - value	'p' - value	Degree of freedom	Significance
Urea (mg/dl)	82.05±30.01±4.5	35.8±5.6±1.5	-10.735	<0.0001	128	ES
Creatinine (mg/dl)	2.20±1.53±0.20	0.91±0.13±0.09	-6.058	<0.0001	128	ES
Uric Acid (mg/dl)	7.16±2.11±0.3	3.5±2.1±0.8	-9.660	<0.0001	128	ES

ES- Extremely Significance.

Maximum patients reports in September to December duration. Most of them present with the respiratory illness with fever and maximum have the history of exposure to endemic areas (specially Rice fields). Transmission of Scrub Typhus disease occurs throughout the year in the tropical areas, whereas in temperate zone transmission is seasonal. Occurrence of the disease is influenced by the rain fall with more chiggers attached to the rodents in the wetter months of year which might be the reason for clustering of cases during the rainy season as shown by Gurung et al.¹¹ Several hypothesis have been proposed to explain the mechanism by which *Orientia Tsutsugamushi* leads to the Acute Renal Failure. Firstly it is assumed that the pathophysiology of ARF is associated with the pre-renal Azotemia due to renal hypo-perfusion in case of shock. Dumler et al. said that vasculitis in typhus leads to vascular leakage and renal hypo-perfusion which causes pre renal Azotemia. Hypoalbuminemia is commonly noted in patients with Rickettsial infection, because of peripheral leakage of albumin because of vascular damage. Additionally, Acute Tubular Necrosis might causes renal failure because of direct invasion of *O. Tsutsugamushi* into renal parenchyma.¹² Lee SK et al. also demonstrated the renal derangement associated with the scrub typhus patients and in accordance of this study.¹³ Krishna P V et al. demonstrated renal damage as blood urea- 96 mg/dl. S. creatinine- 2mg/dl in a case report of Andhra Pradesh in India.¹⁴ Bhargava A. et al. also demonstrated the mean rise of serum creatinine >2.0 mg/dl in Scrub Typhus patients.¹⁵ Doxycycline 200mg/day is used as treatment of choice for Scrub Typhus. These results are in accordance with our study.

5. Conclusion

We concluded that the Scrub Typhus is an Important cause of Acute febrile Illness, which probably Presents with undifferentiating symptomatology from other febrile illnesses in most of the Northern areas of India, particularly in rainy and winter seasons. It should be considered in Differential Diagnosis of Patients with acute febrile illness specially if patient is presenting with ARF and where cause of ARF is not suggested by the history given by the patient.

6. Conflict of Interest

The authors declare no conflict of interests..

7. Source of Funding

None.

References

1. Xu G, Walker DH, Jupiter D, Melby PC, Arcari CM. A review of global epidemiology of scrub typhus. *PLOS Negl Trop Dis*. 2017;11(11):e0006062.
2. Paris DH, Shelite TR, Day NP, Walker DH. Unresolved problems related to scrub typhus, A seriously neglected life threatening disease. *Am J Trop Med Hyg*. 2013;89(2):301–7.
3. Singh SP, Singh R, Ahmad N. A study of complications of scrub typhus in a tertiary care institute of Uttarakhand, India. *Int J Res Med Sci*. 2014;2:246–9.
4. Strickman D, Sheer T, Salata K, Hershey J, Dasch G, Kelly D. In vitro effectiveness of azithromycin against doxycycline-resistant and -susceptible strains of *Rickettsia tsutsugamushi*, etiologic agent of scrub typhus. *Antimicrob Agents Chemother*. 1995;39:2406–10.
5. Vivekanandan M, Mani A, Priya YS, Singh AP, Jayakumar S, Purty S. Outbreak of scrub typhus in Pondicherry. *J Assoc Physicians India*. 2010;58:24–8.
6. Mahajan SK. Scrub typhus. *J Assoc Physicians India*. 2005;53:954–8.
7. Ashraf M, Farooq A, Bashir S, Shah S. Renal Failure associated with scrub typhus. Scrub typhus emerging threat. *JK Sci*. 2010;12(2):81–2.
8. Tietz NW. Fundamentals of Clinical Chemistry. 3rd ed. Philadelphia: WB Saunders; 1987. p. 967.
9. Calam RR. Specimen Processing Separator Gels: An Update. *J Clin Immunoassay*. 1988;11:86–90.
10. Tietz NW. Fundamentals of Clinical Chemistry. 3rd ed. WB Saunders: Philadelphia; 1987. p. 684–6.
11. Gurung S, Pradhan J, Bhutia PY. Outbreak of scrub typhus in the North East Himalayan region: An emerging threat. *Indian J Med Microbiol*. 2013;31(1):72–4.
12. Dumler JS, Taylor JP, Walker DH. Clinical and Laboratory features of murine typhus in south Texas. *JAMA*. 1980;266(10):1365–70.
13. Lee SK, Kang KP, Kim W, Kang SK, Lee HB, Park SK. A case of acute renal failure, rhabdomyolysis and disseminated intravascular coagulation associated with scrub typhus. *Clin Nephrol*. 2003;60(1):59–61.
14. Krishna PV, Ahmed S, Reddy KVN. A case report of scrub typhus. *J NTR Univ Health Sci*. 2015;4:47–9.
15. Bhargava A, Kaushik R, Kaushik RM, Sharma A, Ahmad S, Mittal G, et al. Scrub typhus in Uttarakhand & adjoining Uttar Pradesh: Seasonality, clinical presentation, predictors of mortality. *Indian J Med Res*. 2016;144(6):901–9.

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