Renal Manifestations in Pediatric Scrub Typhus patients of Hilly District of North India

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Author Details
Dr. Raju & Dr. Vipin Roach

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Introduction

The World Health Organization has reported scrub typhus one of the world’s most under diagnosed and under reported disease that often requires hospitalization. Better understanding of the vectors, its outbreaks and its pathogenesis is required to control human outbreaks within and beyond its recognized regions of endemcity (Luca-Fedrow, A. et al., 2018; & World Health Organization. 2018).

Background: Scrub typhus is a well documented zoonotic disease in Himachal Pradesh as the climatic and geographical conditions are conducive for spread of vector of this disease. The aim of this study is to determine the renal manifestations among patients with Scrub typhus. 

Materials and Methods: This cross-sectional Sero-Epidemiological study was conducted in the department of Pediatrics, Indira Gandhi Medical College, and Shimla from 1st June 2017 to 30th Nov 2018. The study participants were newly diagnosed paediatric cases (n-102) of scrub typhus with a positive Scrub typhus IgM ELISA test. 

Results: Facial puffiness was present in (8.78%), swelling feet (1.09%) and decreased urine output (5.49%) patients. Renal dysfunction was present in 48 (47.1%) cases (urea > 40mg) with range of 10-210mg with mean of 63.66±1.88, (creatinine > 1.5mg) 42(41.2%) cases with range of 0.4-6mg with mean of 1.68±3.0, hyponatremia ( < 135meq) in 40 (39.2%) , hypokalemia (>3.5meq) 6(5.9%) cases.

Conclusion: The general physicians should be sensitized regarding renal Findings associated with Scrub typhus which are useful diagnostic clue.

Keywords: Renal manifestations, scrub typhus, Shimla.

Renal complications may prolong its morbidity and even lead to death, and an elevated creatinine level was found to be an independent predictor of mortality (Liang, X. J. et al., 2014). Acute kidney injury (AKI) is an under-recognized complication of Scrub typhus and is a predictor of mortality (Kumar, V. et al., 2014; & Hsu, G. J. et al., 1993). Antibiotics and supportive therapy often result in resolution of AKI. The development of AKI is multifactorial, mostly being observed in the setting of multi-organ failure (Rajapakse, S. et al., 2017).

Himachal Pradesh is a mountainous state in northern India, situated at an altitude between 350-6816 meters above mean sea level. During the rainy seasons, areas of lower altitudes experience an average temperature between 20°C to 35°C which is suitable for the spread of arthropod vector. Maximum number of the cases is being reported between the months of July to November (Sharma, A. et al., 2005).

Scrub typhus is an acute febrile illness caused by O. tsutsugamushi (Kim, D. M. et al., 2007). Acute renal failure is not common sequelae, but is known to be one of the serious complications seen in patients with scrub typhus. Hematuria and proteinuria may occur because of renal invasion in 10 to 20% of patients with scrub typhus. Pre renal azotemia is main pathophysiology of renal failure caused by decreased effective renal blood flow due to increased vascular permeability by systemic vasculitis. Several hypotheses have been proposed to explain the mechanism by which O. tsutsugamushi infection causes acute renal failure. It is assumed that the pathophysiology of acute renal failure is associated with prerenal azotemia due to renal hypoperfusion in cases of shock or volume depletion (Dumler, J. S. et al., 1991).

According to Dumler et al., (1991) pre renal azotemia is the main pathophysiology of renal failure caused by the decrease of effective renal blood flow due to increased vascular permeability in patients with murine typhus accompanied by systemic vasculitis. Hypoalbuminemia is commonly noticed to occur in patients with rickettsial disease. This has been reported to be due to the leak age of plasma albumin into the perivascular space because of widespread vascular damage (Mohd, A. et al., 2007). Additionally acute tubular necrosis might cause renal failure because of the direct invasion of O. tsutsugamushi into a renal parenchyma (Amano, K. I. et al., 1993).

Abstract:

Background: Scrub typhus is a well documented zoonotic disease in Himachal Pradesh as the climatic and geographical conditions are conducive for spread of vector of this disease. The aim of this study is to determine the renal manifestations among patients with Scrub typhus. Materials and Methods: This cross-sectional Sero-Epidemiological study was conducted in the department of Pediatrics, Indira Gandhi Medical College, and Shimla from 1st June 2017 to 30th Nov 2018. The study participants were newly diagnosed paediatric cases (n-102) of scrub typhus with a positive Scrub typhus IgM ELISA test. Results: Facial puffiness was present in (8.78%), swelling feet (1.09%) and decreased urine output (5.49%) patients. Renal dysfunction was present in 48 (47.1%) cases (urea > 40mg) with range of 10-210mg with mean of 63.66±1.88, (creatinine > 1.5mg) 42(41.2%) cases with range of 0.4-6mg with mean of 1.68±3.0, hyponatremia ( < 135meq) in 40 (39.2%) , hypokalemia (>3.5meq) 6(5.9%) cases. Conclusion: The general physicians should be sensitized regarding renal Findings associated with Scrub typhus which are useful diagnostic clue.

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Scrub typhus is a well documented disease in the state of Himachal Pradesh, but there have been no studies on renal manifestations which is associated with the exposure to Orientia tsutsugamushi in the paediatric age group population. Therefore, this study was done to determine the renal manifestations among patients with Scrub typhus.

Aims and Objectives
- To determine the renal manifestations among patients with Scrub typhus.

Materials and Methods
This study was conducted in the department of Paediatrics, Indira Gandhi Medical College, Shimla, a tertiary care teaching institute in Himachal Pradesh.

Duration of study: From 1st June 2017 to 30th Nov 2018.

Study Design: Cross-sectional Study.

Ethical Clearance: Approval from the Institutional ethical committee of Indira Gandhi Medical College Shimla.

Study Population
The study participants consisted of all 102 newly diagnosed paediatric cases of scrub typhus, admitted in pediatric ward of IGMC Hospital Shimla based on positive IgM against scrub typhus during the study period.

Exclusion Criteria
- The study subjects having concomitant HIV, Malaria, Tuberculosis, Hepatitis, Typhoid and Acinetobacter septicaemia.
- Participants in the control group B and group C having febrile illness during the last three months.
- Participants or their parents who are not willing to participate in the study.

Sampling Method
All the diagnosed cases of scrub typhus based on enrolment criteria at the time of admission in the paediatric ward were enrolled.

Statistical Analysis
Data from the case record files was recorded on a Microsoft excel spreadsheet. Statistical analysis was performed using Epi Info 7. All discrete variables were expressed as percentages.

Results
In the present study, among 102 newly diagnosed cases of Scrub Typhus, 57 (55.9%) were males while 45 (44.1%) were females. 39 (38.2%) were in the age group of 1-10 years while 63 (61.8%) were in the age group of 11-18 years.

Renal Dysfunction
Facial puffiness was present in 8(7.8%), swelling feet 10(0.9%) and decreased urine output 5(4.9%) patients. Renal dysfunction was present in 48 (47.1%) cases (urea > 40mg) with range of 10-210mg with mean of 63.66±51.88, (creatinine > 1.5mg) 42(41.2%) cases with range of 0.4-6mg with mean of 1.68±1.30, hyponatremia (<135meq) in 40 (39.2%), hypokalemia (<3.5meq) 6(5.9%) cases.

Discussion
Scrub typhus is an underappreciated cause of acute febrile illness in many parts of India (Mahajan, S. K., & Bakshi, D. 2007; & Kamarasu, K. et al., 2007). It is caused by the rickettsial pathogen O. tsutsugamushi, which is transmitted by the bite of larval trombiculid mites inhabiting scrub vegetation. Often, & results in life-threatening complications such as acute respiratory distress syndrome, hepato-renal dysfunction, and meningoenephelitis (Mahajan, S. K. et al., 2006).

In our study Renal dysfunction was present in 48 (47.1%) cases (urea > 40mg) with range of 10-210mg with mean of 63.66±51.88, (creatinine > 1.5mg) 42(41.2%) cases with range of 0.4-6mg with mean of 1.68±1.30, hyponatremia (<135meq) in 40 (39.2%), hypokalemia (<3.5meq) 6(5.9%) cases which was similar to study conducted by Vikrant et al., (2013). The cause of acute renal failure was believed to be multifactorial in origin. The presumed causes could be renal hypoperfusion resulting from shock or volume depletion, vasculitis, rhabdomyolysis, acute interstitial nephritis and direct micro invasion of the renal tubules causing acute tubular necrosis (Vikrant, S. et al., 2013).

Conclusion & Recommendations
Scrub typhus is endemic and documented zoonosis in the state of Himachal Pradesh as the climatic and geographical conditions are conducive for spread of vector of the scrub typhus. The general physicians should be sensitized regarding renal Findings associated with Scrub typhus which provides useful clue in diagnosis.

References
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