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Prevalence of Thrombocytopenia in Acute Kidney Injury Cases Associated Scrub Typhus

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Abstract

Scrub typhus is a vector borne zoonotic disease producing varieties of clinical complications like acute encephalitis syndrome (AES), Acute respiratory distress syndrome (ARDS), multi organs dysfunction(MODS) and deaths also. Acute kidney injury (AKI) is one of the common clinical manifestations while progressing for MODS, where AKI has been found to be associated with thrombocytopenia .In this review a small effort has been made to throw light upon prevalence of thrombocytopenia in scrub typhus cases.

Keywords: Scrub Typhus; AKI; Thrombocytopeni; Risk factors

Introduction

Orientia tsutsugamushi, an obligate intracellular gram-negative bacterium, is the causative agent of scrub typhus. Infected trombiculid mite larvae bite and transmit the disease [1]. As early as 1899, fatality rates ranged from 7% to 9% for cases reported from Japan. The "tsutsugamushi triangle" is a region in the world where scrub typhus is prevalent [2,3]. As a public health issue, scrub typhus affects the majority of Asia-Pacific countries, threatening one billion people each year with sickness [4]. When Hashimoto first described scrub typhus in 1810, he called it "tsutsugamushi sickness." The death rate of scrub typhus remains high and can reach as high as 70% without effective treatment, despite the fact that the median mortality rate of untreated patients is 6% and that of treated patients is 1.4%. Scrub typhus often has renal involvement, which can range from 10% to 60% depending on the etiopathogenetic mechanism.For example, urine abnormalities such albuminuria and active urinary sediments like cellular cast and pyuria can range from mild to severe renal involvement, which necessitates immediate beginning of renal replacement therapy [4-6]. In cases of scrub typhus, thrombocytopenia has been found to be a predictor of acute renal injury [7-9], mortality [10], and the need for Intensive care [10]. Scrub patients have been shown in previous research [8-12] to have thrombocytopenia, a frequent manifestation of a dysregulated haematological component.

Scrub Typhus

Epidemiology of Scrub Typhus

Approximately 1 billion people are at risk, and an estimated 1 million cases are reported each year [13]. In South Asia and Southeast Asia, the disease is widespread [14]. A huge number of people could be infected because it can be spread in both rural and semi-urban areas. Up to 23% of fever hospitalizations in some Southeast Asian regions are attributed to scrub typhus [15-18]. Studies in six Asian nations found seroprevalence varying widely, from 9.3% to 27.9% [19], with a median of 22.2 %. With a median

of 4.6/100,000/10 years, nations with passive national surveillance systems appear to have seen an increase in disease incidence [19]. There is a wide range of mortality rates, with a median of 6% in untreated cases, reducing to 1.4% in treated cases [20]. Disability adjusted life years (DALYs) have been computed in one study from eastern China, with an estimate of 1.06/100,000 [21].

Diagnosis of Scrub Typhus

A macular, maculopapular, or vesicular rash occurs after fever, myalgia, headache, gastrointestinal symptoms, and cough. Interstitial pneumonia, meningoencephalitis, increasing hypotension, multi-organ failure and death can all occur even in cases where the disease is mild and self-limiting. Preliminary laboratory evidence, including low platelet counts, a low to normal white blood count (as well as signs of moderate transaminitis and hyponatremia), history of exposure to the mites, and travel to a location where the disease is common all help in making the diagnosis more difficult. Indirect immunofluorescence assay, immunoperoxidase assay, enzyme-linked immunoassays or Weil-Felix test, are the serological tests that detect cell wall antigen. Scrub typhus can also be diagnosed by molecular technique called polymerase chain reaction for 56 kDa/45 kDa cell antigens [8].

Scrub typhus and AKI

Hospitalizations for acute kidney injury (AKI) have increased significantly in recent years, with an estimated 13–18 % of patients suffering from the condition being affected by it. This results in an increase in the length of time patients spend in the hospital, as well as increased healthcare expenses and poor outcomes, particularly in patients with chronic renal disease (CKD) [22], Kidney is the main organ for blood filtration which helps in reabsorption of water in elimination of urine but dysregulation of this process leads to acute kidney injury [23]. Acute kidney injury (AKI) is common in patients with infectious disease, particularly those with sepsis. Scrub typhus is associated with a wide range of renal consequences, ranging from simple haematuria or proteinuria (10–20 % incidence of scrub typhus) to more serious ones, such as acute renal failure, nephrotic syndrome, and end-stage renal disease leading to long-term haemodialysis and need renal replacement therapy [24]. Depending on the classification criteria, the incidence of AKI in scrub typhus might range from 8 % to 40 %. Poor research has been done on the risk factors and prognosis of AKI in association with the scrub typhus. Scrub typhus patients with AKI, particularly those with concomitant conditions including diabetes mellitus (DM), hypertension, and chronic kidney disease (CKD), have a poor prognosis and a lengthy hospital stay [22].

Acute kidney injury (AKI) can be caused by bacterial infiltration and direct effects on kidney tissue, intravascular hemolysis, rhabdomyolysis, renal ischemia due to hemodynamic instability, and vasculitis. ATN, interstitial nephritis, and mild mesangial glomerulonephritis were seen in histopathology. Short-term mortality has been linked to an increased risk of AKI. Doxycycline can have a significant impact on the health of most patients, including the restoration of renal function, if administered early and properly [25].

Prevalence of Thrombocytopenia in Scrub typhus

Thrombocytopenia

Thrombocytopenia is a common manifestation in many children's illnesses, both febrile and non-febrile. It's called "severe" thrombocytopenia when the platelet count is under 50,000 per cubic millimetre, whereas "thrombocytopenia" describes a platelet count of under 150,000 per cubic millimetre. It is possible to suffer from pseudo-thrombocytopenia if EDTA concentrations are too high during blood sampling. Impaired platelet production, utilization, and sequestration of platelets, as well as a combination of the aforementioned two factors, are the basic processes of thrombocytopenia. Immune thrombocytopenia (ITP) and drug-induced thrombocytopenia are caused by a variety of mechanisms. Thrombocytopenia is frequently seen in patients with acute febrile illnesses such as dengue and malaria [26].

Mode of Action

Thrombocytopenia is a common symptom of this disease and is frequently part of a larger pattern of symptoms that indicate multi-organ dysfunction. Thrombocytopenia in multi-organ failure can be explained by a number of mechanisms [27]. It is possible for scrub typhus to produce thrombocytopenia and MODS. Thrombocytopenia-associated MODS is thought to be caused by thrombotic microangiopathic syndrome, according to previous research [28,29]. Thrombotic thrombocytopenic purpura (TTP), secondary thrombotic microangiopathy (TMA), and DIC may all be present [28].

Prevalence

Thrombocytopenia has been recorded in over half of scrub typhus patients with acute kidney injury [9-11,30,31]. Thrombocytopenia has been identified as a predictor of mortality [10] as well as a risk factor for the need for an intensive care unit [28]. Platelet levels have been found to be considerably lower in patients with scrub typhus compared

to a healthy population in some investigations [12,30-32]. Human kidneys are the major organ for blood filtration and these organs also helps in reabsorption of water in elimination of urine or urine excretion. When kidneys are injured suffered from kidney injuries, artificial kidneys are ultimate option for performing the function of kidneys.

Conclusion

Climate change and water scarcity are projected to pose severe problems to kidney health in Asia's tropical regions. Heat stress, as well as the re-emergence of water- and vector-borne infectious illnesses, is likely to put kidneys at risk. There is evidence that disease-causing organisms' virulence is evolving, as seen by the rise of kidney injury in *P. vivax* malaria and scrub typhus, and that management is becoming more difficult as antibiotic resistance emerges. In suspected scrub typhus cases or severe febrile sickness, fast information on platelet level is also required so that an emergency transfusion or treatment to improve platelet level can be administered.

Conflict of Interest: None

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