Prevalence and outcome of acute kidney injury in dengue patients in a tertiary care hospital, India

Jaiju James Chakola

Sri Ramachandra Institute of Higher Education and Research Centre, India

Abstract

Dengue is a growing public health problem and AKI is one of the major complications of dengue virus infection. A total of 922 dengue patients were retrospectively evaluated and were stratified into AKI and non-AKI groups. Two groups were compared using appropriate statistical methods. There were 103 patients (11.2%) who had AKI, with AKIN-I, II and III in 68.8%, 23.6% and 7.6% patients, respectively. Significant differences (P<0.05) in demographics and clinic-laboratory characteristics were observed between patients with and without AKI. Presence of DHF [OR (95% CI): 8.0 (P<0.001], rhabdomyolysis [OR (95% CI): 7.9 ,MODS [OR (95% CI): 34.6 [P<0.001], diabetes mellitus [OR (95% CI): 4.7, P=0.034], late hospitalization [OR (95% CI): 2.1 ,P=0.033] and use of nephrotoxic drugs [OR (95% CI): 2.9 P=0.006] were associated with AKI. Longer hospital stays (>7 days) was also observed among AKI patients (OR=1.3, P=0.044). Additionally, 24.5% AKI patients had renal insufficiencies at discharge that were significantly associated with severe dengue. Overall mortality was 1.8% and all fatal cases had AKI. The incidence of AKI is high at 11.2% among dengue patients, and those with AKI portended significant morbidity, mortality, longer hospital stays and poor renal outcomes. Dengue viral infection has emerged as one of the most common arthropod borne diseases and is more prevalent in the tropical countries. It has varied clinical spectrum ranging from undifferentiated fever to severe hemorrhagic fever and shock with multi-organ dysfunction. Acute kidney injury (AKI) is lesser known complication in DVI. Although studies report varying reports of AKI in DVI among children, exact incidence is not known as most of the studies are retrospective. Hospital-based observational study in 105 children with DVI requiring admission was studied for the occurrence of AKI along with clinical course and outcome. AKI Network (AKIN) criteria were used to define AKI. The IBM SPSS Statistics software version 21.0 was used for the statistical analysis. Of 105 children with dengue, six (5.71%) cases developed AKI. All six cases had urine output <0.5 mL/kg/h for ≥12 h. Out of six cases with AKI, four had raised serum creatinine (SCr) ≥0.3 mg/dL at admission. One child had normal SCr level at admission which got deranged over the next 12 h, one child had oliguria (<0.5 mL/kg/h) for about 24 h though the renal function was not deranged. Out of six children with AKI, three (50%) in Stage III and three had AKI Stage II as per the AKIN criteria. Children with AKI (Group A) differed significantly from those without AKI (Group B) in having blood pressure <3rd centile (P = 0.0023), tachycardia P = 0.008), hyponatremia and hypokalemia (P <0.001 and P = 0.029, respectively) and poor outcome 6% mortality in Group B compared to 66.67% in Group A) with P = 0.001. AKI is not a common complication of DVI but if develops it may lead to significant morbidity and mortality among pediatric age group.

Introduction:

Dengue infection has been identified as the fastest spreading mosquito-borne viral disease by World Health Organization. It is an important febrile illness with wide spectrum of manifestations seen mainly in tropical countries. WHO estimates 50–100 million cases of dengue in each year resulting in 24,000 deaths per year. Dengue is a mosquito-borne disease, caused by serologically related but antigenically distinct single-strand RNA viruses; the viruses have been grouped into four serotypes (DENV-1, DENV-2, DENV-3, and DENV-4) belonging to the genus Flavivirus (family: Flaviviridae). Aedes aegypti is the primary mosquito vector; however, other species from the genus Aedes, such as Aedes albopictus, can also be vector of dengue virus transmission .Incubation period of dengue virus infection is 3–14 days with a variety of clinical manifestation including asymptomatic infection, undifferentiated fever, dengue fever, dengue hemorrhagic fever , and life-threatening dengue shock syndrome . Similar to other tropical infections, dengue infection is associated with multiple organ dysfunction involving liver, muscles, heart, brain, and kidneys . Dengue fever has been

associated with various types of renal manifestations such as proteinuria, hematuria, glomerulonephritis, and acute kidney injury. The incidence of these renal manifestations varies between 17% and 62% in patients with dengue fever. Such complications impose a heavy burden on the country not only in terms of morbidity and mortality but also impact the economic growth of the country. Currently, there is relatively sparse data from Bangladesh on the renal manifestations of dengue fever and their outcomes. Hence, this prospective cross sectional study was designed to analyze the frequency, characteristics, and clinical outcome of dengue fever in children with renal manifestations. Dengue viral infection is one of the most important mosquito-borne diseases in the world. In India, the first proven epidemic of dengue fever occurred in Kolkata in 1963–1964. With rapidly changing epidemiology, the footprint of DVI has dramatically expanded over the past few decades. At present, all the four serotypes are seen, but the predominant serotype varies with time. The clinical spectrum of DVI ranges from self-limiting illness to life-threatening dengue hemorrhagic fever or dengue shock syndrome).Several mechanisms have been proposed for DF-induced acute kidney injury (AKI), including direct action

by the virus, hemodynamic instability, rhabdomyolysis, and acute glomerular injury. Previous studies have shown great disparity in the incidence of dengue induced AKI ranging from 0.83% to 13.3%.In most of the previously conducted studies, AKI incidence was reported in patients with DHF, and only few studies have reported the incidence of AKI in DVI. Given the epidemic potential and endemicity of DVI in India, the aim of this retrospective study was to evaluate the incidence, clinical characteristics, severity, predictors of AKI, and impact of AKI on the length of hospital stay and mortality in DVI.

Conclusion:

The epidemiology of AKI in the current study appears to be different from other studies from India. The clinical and epidemiological characteristics of HAAKI and CAAKI also vary considerably. HAAKI is common in surgical ICUs, whereas CAAKI is common in medical ICU's. Sepsis and acute abdominal emergencies are the most frequent causes of CAAKI, whereas trauma and cardiac causes are common causes of CAAKI. A major proportion of AKI in ICU in the current study had preventable etiologies. The mortality rates were similar between HAAKI and CAAKI. The underlying vital organ dysfunction appears to be a major predictor of death. More multicentric studies are required to delineate the region-specific differences in AKI. Understanding the regional differences in the disease patterns is imperative in formulating policies addressing the local needs. Dengue fever is associated with a variety of renal disorders. Acute renal failure is a serious complication of dengue fever and carries a high mortality rate. Transient proteinuria and hematuria has been detected in most patients with dengue fever. These findings will draw an attention to the need for clinicians' alertness to this renal complication of dengue fever in children. Adequate knowledge of clinical profile and predictors of AKI development would help in early intervention to prevent complication of renal involvement in children with dengue fever. To conclude, AKI is not a common complication of DVI, but if develops it may lead to significant morbidity and mortality among the pediatric age group. DSS is an important risk factor for the development of AKI in dengue. Hence, one should be vigilant in Dengue patients regarding progression to AKI as early diagnosis and intervention alter the prognosis significantly.