A Study on Acute Kidney Injury in Patients of Dengue Fever in Western Uttar Pradesh Population

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ABSTRACT

Introduction: Dengue fever is a systemic acute viral illness caused by Arbo virus from genus flavivirus highly prevalent in the tropics and subtropics, transmitted by Aedes (aegypti and albopictus) mosquito. Pathogenesis of AKI due to dengue include direct action by the virus, hemodynamic instability, rhabdomyolysis, hemolysis and acute glomerular injury. This study was planned to know the incidence and severity of AKI in patients of Dengue fever.

Material and methods: Our study was an observational retrospective study, done in Subharti Medical College, Deptt. Of Medicine, Meerut between July 2017-December 2018. Medical records of 320 Dengue IgM+ patients admitted during this period were studied. Patients were classified into dengue fever, dengue hemorrhagic fever, dengue shock syndrome.

Results: Out of total 320 patients positive for dengue IgM, 48 patients (15%) were found to develop AKI. Out of the total 48 patients developing AKI, 26 patients presented with Dengue fever, 16 were with Dengue Hemorrhagic Fever and 6 presented with dengue shock syndrome. Out of the 48 patients diagnosed with AKI, 34 patients fall under KDIGO criteria I, 10 patients fall under KDIGO II, 4 patients fall under KDIGO III.

Conclusion: Our study concluded that AKI is a major and serious complication, and it is the major cause of Mortality and morbidity in dengue fever.

Keywords: Dengue, AKI

INTRODUCTION

Dengue fever is a systemic acute viral illness caused by Arbo virus from genus flavivirus highly prevalent in the tropics and subtropics.¹ Dengue is a serious global health threat by the World Health Organization. It is transmitted by mosquitoes of the genus Aedes (aegypti and albopictus), with Aedes aegypti as the main vector.² Dengue exhibits various patterns of clinical presentation with unpredictable clinical progression and outcomes, ranging from clinically inapparent forms to severe bleeding and shock, eventually resulting in death. Reinfection with a different serotype is associated with severe clinical manifestations, likely due to cross-reactive antibodies.

Dengue and AKI

AKI is a significant, and poorly studied complication of dengue. Several mechanisms have been proposed to account for the etiopathogenesis of dengue fever-induced AKI, including direct action by the virus, hemodynamic instability, rhabdomyolysis, hemolysis and acute glomerular injury.³ While none of the available evidence patently favors any such mechanisms at the expense of the others, often two or more mechanisms coexist simultaneously in the same patient.

The data available are heterogeneous and mostly originate from retrospective case series and case reports. The reported frequency of this association shows wide variation in accordance to the different population assessed, severity of dengue, criteria which was used for the diagnosis of AKI and time of evaluation.

The present study was taken to evaluate the incidence and severity of acute kidney injury in dengue fever in Western Uttar Pradesh population.

MATERIAL AND METHODS

Our study was an observational retrospective study. The study was done in Subharti Medical College, Deptt. Of Medicine, Meerut between the period of July 2017-December 2018. Medical records of 320 Dengue IgM+ patients admitted during this period were studied and data regarding the severity of dengue fever, duration of stay, severity of kidney injury was collected, tabulated and analysed.

Exclusion Criteria include known cases of Chronic Kidney Disease, patients of Chronic liver disease, patients positive for other Rickettsial illnesses like scrub typhus, patients of chronic viral illnesses like Hep C, Hep B and HIV. Dengue fever classification According to severity:³

Dengue Fever

- Acute Febrile illness with >2 of the following:
  - Headache
  - Retro-orbital Pain
  - Myalgia
  - Rash
  - Hemorrhagic Manifestations
  - Leukopenia

Dengue Hemorrhagic Fever

All of the following must be present:

- Fever Lasting 2-7 days, occasionally biphasic
- Hemorrhagic Manifestations with at least one of the

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Viral antigen has also been isolated which may lead to decreased kidney perfusion and 100% of the patients developed AKI which constitute 11%, while 16 patients stayed for 5-7 days, 26 patients stayed for 8-14 days and 10 patients had prolonged stay of more than 15 days (table-3).

DISCUSSION

Tropical acute febrile illnesses are common causes of Acute Kidney Injury (AKI) in developing countries. Tropical infections like malaria, scrub typhus, enteric fever, leptospirosis and hantavirus have been reported to cause AKI along with dengue virus. AKI is a complication of dengue Viral Infection which has not been studied much. There are multiple proposed mechanisms for etiopathogenesis of renal impairment in dengue Viral Infection. Infection with dengue virus causes capillary leakage leading to loss of fluid from intravascular compartment into interstitial space which may lead to decreased kidney perfusion and acute tubular necrosis. Possible etiological factors for AKI in dengue Fever include hypotension with either hemolysis or rhabdomyolysis and shock as reported in various case reports. Cases of unexplained AKI has also been reported. Interessingly, dengue may cause glomerular injury in addition to the above-mentioned mechanisms as reported in one study Jessie K et al. Viral antigen has also been isolated from tubular epithelial cells.

Acute kidney injury is an overlooked complication of dengue IgM+ patients. Lee et al. reported an incidence of 3.3% among adults in Taiwan. Khalil et al. identified AKI in 13.3% of a series of patients with dengue confirmed by the presence of IgM antibodies. In our Study also out of 320 patients 48 patients (15%) developed AKI according to Kidney Disease Global outcome (KDIGO, 2012) Criteria.
Mortality has been noted in vast majority of patients landing up in AKI, Laoprasopwattana et al. found that patients who had oliguric AKI had a higher mortality rate than those with non-oliguric AKI. Our study also concluded that 6 out of 48 patients landed up in oliguria/anuria requiring hemodialysis, of which 2 patients (4.16%) died. Hence Patients landing in severe dengue and anuria greater mortality has been noted.

Dengue is associated with significant morbidity and mortality as well as increase in economic burden. The average length of hospital stay in patients with dengue has been reported to be 3–4 days in various studies. Khan et al. from Saudi Arabia reported length of stay of 4 days. Similarly, Lye D et al conducted a study in Singapore reported the mean stay as 3 days. Parkash et al. reported a mean hospital stay of 4 days in patients with associated hepatitis.

In our study also we found that longer hospital stay is associated with more severe infection leading to mortality and Hemodialysis. We did not come across any published literature looking at the impact of AKI on hospital stay in patients with Dengue Viral Infection.

This study has several limitations. The study is retrospective in nature and is of limited clinical use as the study focused on inpatients, therefore excluding patients who visited outpatient clinics and other hospitals. Also, the study was limited to a single center. Moreover, histopathology reports in clinically indicated cases were not available to elucidate etiopathogenesis of AKI. Patients were followed till discharge and there was no long term follow up. Prospective studies are needed with renal biopsy in clinically indicated cases along with a long-term follow-up to know more about the etiopathogenesis and outcome of AKI in Dengue Fever.

CONCLUSION

Our study concluded that AKI is a major and serious complication, and it is the major cause of Mortality and morbidity in Dengue fever.

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