

## Original Research

### Renal involvement in children with dengue fever

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#### ABSTRACT:

**Background:** Dengue is a disease caused by any one of closely related dengue viruses (DEN1, DEN 2, DEN 3 & DEN 4). This study was conducted to assess renal involvement in children with dengue fever. **Materials & Methods:** 70 children age ranged 1-14 years of both genders were diagnosed of dengue fever were enrolled. Renal manifestations were divided into AKI groups using pRIFLE criteria. **Results:** Out of 70 patients, males were 42 and females were 28. The mean serum Na (mmol/L) was 130.4 and 132.1, serum K (mmol/L) was 3.75 and 3.65, serum creatinine ( $\mu$ mol/L) level was 178.4 and 88.2, leucocytes ( $\times 10^9$  /L) was 5.16 and 5.38 and platelet ( $\times 10^9$  /L) count was 81.4 and 90.5 in patients with renal involvement and without renal involvement respectively. The difference was non-significant ( $P > 0.05$ ). Proteinuria + was present in 8, ++ in 3, +++ in 2 and in nephrotic range in 1 patient. The difference was significant ( $P < 0.05$ ). **Conclusion:** Renal involvement in dengue-infected youngsters is not unusual. In order to avoid renal involvement, a thorough clinical and laboratory assessment may be beneficial.

**Key words:** Dengue haemorrhagic fever, renal, Aedes

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#### INTRODUCTION

Dengue (pronounced Den' gee) is a disease caused by any one of closely related dengue viruses (DEN1, DEN 2, DEN 3 & DEN 4). The viruses are transmitted to human by the bite of an infected mosquito, Aedes Aegypti but 2001 outbreak in Hawaii was transmitted by Aedes Albopictus.<sup>1</sup> The Asian genotypes of DEN-2 and DEN-3 are frequently associated with severe disease. Dengue virus is a RNA virus of the family flaviviridae; they are otherwise called arboviruses. The dengue virus genome contains 11,000 nucleotide bases.<sup>2</sup> They have 3 different protein molecules that form virus particle (C, prM and E) and 7 other types of protein molecules (NS1, NS2a, NS2b, NS3, NS4a, NS4b, NS5) that are found in infected host cells and are required for replication of virus. There are 4 strains of virus, ex; DEN1, DEN2, DEN3, DEN4. ALL 4 serotypes can cause full blown disease. Infection with 1 serotype is believed to produce lifelong immunity to that serotype, but he can be infected with other serotypes in future.<sup>3</sup>

This is believed to be due to multiple factors like, rapid urbanization, population growth, increase in believed international travel from endemic areas and lastly global warming. The geographical distribution is around the equator mainly affecting Asia and pacific regions.<sup>4</sup> Dengue fever has been associated with various types of renal manifestations such as proteinuria, hematuria, glomerulonephritis, and acute kidney injury (AKI). 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.<sup>5</sup> The present study was conducted to assess renal involvement in children with dengue fever.

#### MATERIALS & METHODS

The present study comprised of 70 children age 1-14 years of both genders. Parents' consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. All cases were diagnosed with either NS1 positive or antibody IgM positive or both IgM and IgG positive. Renal manifestations were divided into AKI groups using pRIFLE criteria. Proteinuria was defined as

urinary protein >1+ (30 mg/dL) by dipstick test. Hematuria was defined as red blood cell (RBC) >5/ $\mu$ L in a fresh uncentrifuged urine specimen. Data were collected and were subjected to statistical analysis. P value < 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Total- 70		
Gender	Males	Females
Number	42	28

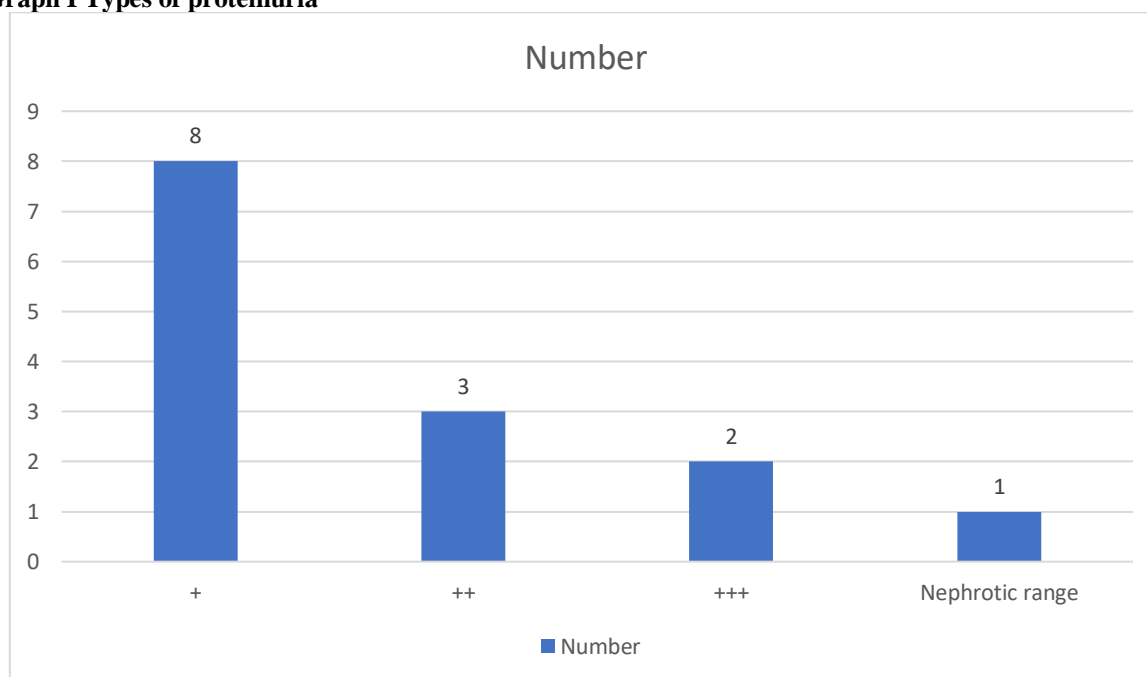
Table I shows that out of 70 patients, males were 42 and females were 28.

**Table II Assessment of laboratory parameters**

Variables	With renal involvement	Without renal involvement	P value
Serum Na (mmol/L)	130.4	132.1	0.97
Serum K (mmol/L)	3.75	3.65	0.94
Serum creatinine ( $\mu$ mol/L)	178.4	88.2	0.02
Leucocytes ( $\times 10^9$ /L)	5.16	5.38	0.81
Platelet ( $\times 10^9$ /L)	81.4	90.5	0.73

Table II shows that mean serum Na (mmol/L) was 130.4 and 132.1, serum K (mmol/L) was 3.75 and 3.65, serum creatinine ( $\mu$ mol/L) level was 178.4 and 88.2, leucocytes ( $\times 10^9$  /L) was 5.16 and 5.38 and platelet ( $\times 10^9$  /L) count was 81.4 and 90.5 in patients with renal involvement and without renal involvement respectively. The difference was non- significant (P> 0.05).

**Graph I Types of proteinuria**



Graph I shows that proteinuria + was present in 8, ++ in 3, +++ in 2 and in nephrotic range in 1 patient. The difference was significant (P< 0.05).

**DISCUSSION**

In 1906, Aedes mosquitoes transmitting the dengue fever was confirmed and in 1907, Dengue was the second disease after “yellow fever” that was shown to be caused by virus.<sup>6</sup> Dengue hemorrhagic fever is first reported in Philippines in 1953, and in 1981 in South America. Dengue is believed to infect 50 to 100 million people worldwide in a year. The mortality is 1-5% without treatment and less than 1% with

treatment.<sup>7</sup> Severe disease carry a mortality of 26%. The incidence of dengue in increased 30- folds between between 1960 and 2010. Incubation period of dengue virus infection is 3–14 days with a variety of clinical manifestation including asymptomatic infection, undifferentiated fever, dengue fever (DF), dengue hemorrhagic fever (DHF), and life-threatening dengue shock syndrome (DSS). Similar to other tropical infections, dengue infection is

associated with multiple organ dysfunction involving liver, muscles, heart, brain, and kidneys.<sup>8</sup>The present study was conducted to assess renal involvement in children with dengue fever.

We found that out of 70 patients, males were 42 and females were 28. Libraty et al<sup>9</sup> in their study to determine its usefulness as a predictor of DHF, plasma levels of the secreted dengue virus nonstructural protein NS1 (sNS1) were measured daily in 32 children with dengue-2 virus infections participating in a prospective, hospital-based study. Free sNS1 levels in plasma correlated with viremia levels and were higher in patients with DHF than in those with DF. An elevated free sNS1 level (> or =600 ng/mL) within 72 hours of illness onset identified patients at risk for developing DHF.

We observed that the mean serum Na (mmol/L) was 130.4 and 132.1, serum K (mmol/L) was 3.75 and 3.65, serum creatinine ( $\mu$ mol/L) level was 178.4 and 88.2, leucocytes ( $\times 10^9$  /L) was 5.16 and 5.38 and platelet ( $\times 10^9$  /L) count was 81.4 and 90.5 in patients with renal involvement and without renal involvement respectively. We found that proteinuria + was present in 8, ++ in 3, +++ in 2 and in nephrotic range in 1 patient. The febrile phase, which typically lasts 2–7 days, is characterized by high fevers, frequently exceeding 40°C (104°F), along with generalized pain and a headache.<sup>10</sup> At this stage, flushed skin and a few petechiae, little red spots caused by ruptured capillaries, may appear. If there is a critical phase, it usually lasts one to two days and comes after the high fever has subsided.<sup>11</sup> Due to increased capillary permeability and leakage, there may be substantial fluid collection in the chest and abdominal cavity during this period. This causes the organs and circulation to become depleted of fluid. Organ malfunction and significant bleeding (mostly from the gastrointestinal system) are possible during this phase. Less than 5% of dengue patients result in shock and bleeding, but those who have previously been infected with other serotypes of dengue virus have an increased risk of this.

## CONCLUSION

Authors found that renal involvement in dengue-infected youngsters is not unusual. In order to avoid renal involvement, a thorough clinical and laboratory assessment may be beneficial.

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