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ORIGINAL ARTICLE

Assessment of renal involvement in children with dengue fever- A clinical study

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ABSTRACT:

Background: Dengue was the second disease after "yellow fever" that was shown to be caused by virus. The present study was conducted to assess renal involvement in children with dengue fever. **Materials & Methods:** 68 children age ranged 1 year to 12 years of both genders were diagnosed of dengue fever either NS1 positive or antibody IgM positive or both IgM and IgG positive. +e disease severity was classified according to the World Health Organization criteria. Renal manifestations were divided into AKI groups using pRIFLE criteria. **Results:** Out of 34 patients with dengue fever, 4 had renal involvement, out of 20 cases of dengue haemorrhagic fever, 5 had renal involvement, out of 14 cases of dengue shock syndrome, 2 had renal involvement. The mean serum creatinine (µmol/L) level was 180 and 90.2, serum Na (mmol/L) was 132.4 and 132.1, serum K (mmol/L) was 3.95 and 3.65, leucocytes (×109 /L) was 5.12 and 5.34 and platelet (×109 /L) count was 83.4 and 92.5 in patients with renal involvement and without renal involvement respectively (P> 0.05). **Conclusion:** Renal involvement in children with dengue is not uncommon. A thorough clinical and laboratory investigations may be helpful in preventing renal involvement.

Key words: Dengue haemorrhagic fever, leucocytes, serum sodium

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INTRODUCTION

The term dengue fever came into use after 1828. The first record of a case of probable dengue fever is in a Chinese medical encyclopedia from Jin Dynasty which referred to a "water poison" associated with flying insects.[1] 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. 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. [2] The mortality is 1-5% without treatment and less than 1% with treatment. Severe disease carry a mortality of 26%. The incidence of dengue in increased 30 fold between 1960 and 2010. This increase is believed to be to be due to multiple factors like, rapid urbanization, population growth, increase is believed international travel from endemic areas and lastly global warming. The geographical distribution is around the equator mainly affecting Asia and pacific regions.[3]

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.[4] Dengue fever has been associated with various types of renal manifestations such as proteinuria, hematuria, glomerulonephritis, and acute kidney injury (AKI). +e 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.[5] The present study was conducted to assess renal involvement in children with dengue fever.

MATERIALS & METHODS

The present study was conducted among 68 children age ranged 1 year to 12 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 of dengue fever either NS1 positive or antibody IgM positive or both IgM and IgG positive. +e disease severity was classified according to the World Health Organization criteria. 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/µL in a fresh uncentrifuged urine specimen. Data were

collected and were analyzed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 68		
Gender	**Males**	**Females**
Number	40	28

Table I shows that out of 68 patients, males were 40 and females were 28.

Table II Renal involvement according to severity of dengue

Variables	Number	Renal involvement
Dengue fever	34	4
Dengue haemorrhagic fever	20	5
Dengue shock syndrome	14	2

Table II shows that out of 34 patients with dengue fever, 4 had renal involvement, out of 20 cases of dengue haemorrhagic fever, 5 had renal involvement, out of 14 cases of dengue shock syndrome, 2 had renal involvement.

Table III Comparison of laboratory characteristics

Variables	With Renal involvement	Without Renal involvement	P value
Serum creatinine (µmol/L)	180	90.2	0.01
Serum Na (mmol/L)	132.4	132.1	0.91
Serum K (mmol/L)	3.95	3.65	0.82
Leucocytes (×109 /L)	5.12	5.34	0.12
Platelet (×109 /L)	83.4	92.5	0.15

Table III, graph I shows that mean serum creatinine (µmol/L) level was 180 and 90.2, serum Na (mmol/L) was 132.4 and 132.1, serum K (mmol/L) was 3.95 and 3.65, leucocytes (×109 /L) was 5.12 and 5.34 and platelet (×109 /L) count was 83.4 and 92.5 in patients with renal involvement and without renal involvement respectively (P> 0.05).

Graph I Laboratory characteristics

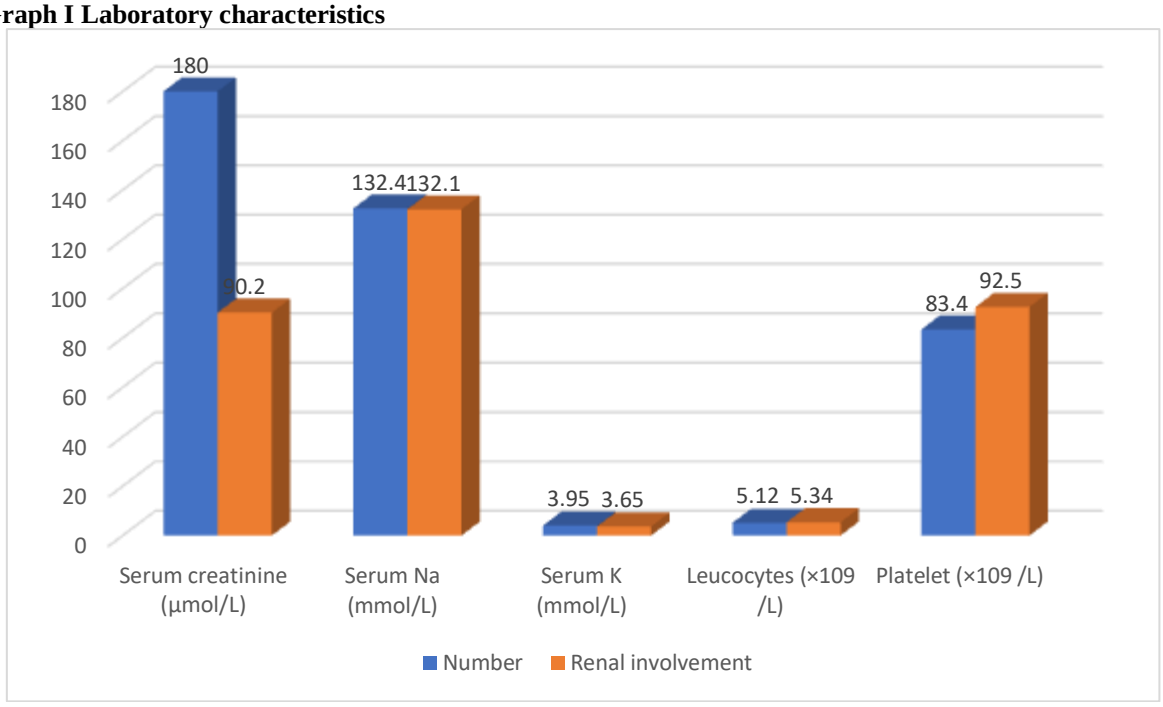

Table IV Types of proteinuria

Proteinuria	Number	P value
+	6	0.01
++	2	
+++	2	
Nephrotic range	1	

Table IV shows that proteinuria + was present in 6, ++ in 2, +++ in 2 and in nephrotic range in 1 patient. The difference was significant (P< 0.05).

DISCUSSION

Dengue (pronounced Den' gee) is a disease caused by any one of closely related dengue viruses (DEN1, DEN 2, DEN 3 &DEN 4).[6] 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.[7] 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 bones.[8] They have 3 different protein molecules that form virus partied (C, prM and E) and 7 other types of protein molecules (NSI, 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.[9] The present study was conducted to assess renal involvement in children with dengue fever.

In present study, out of 68 patients, males were 40 and females were 28. We found that out of 34 patients with dengue fever, 4 had renal involvement, out of 20 cases of dengue haemorrhagic fever, 5 had renal involvement, out of 14 cases of dengue shock syndrome, 2 had renal involvement. Sultana et al[10] evaluated the incidence, characteristics, and clinical outcome of dengue fever with renal manifestations. Among 316 dengue patients, thirty-one patients (9.8%) had renal involvement. Most of the patients (54.83%) with renal manifestations were aged between 1 and 5 years. A total of 14 patients were found to have proteinuria (4.4%). Nephrotic-range proteinuria was seen in only one patient (0.3%). AKI was defined by pRIFLE criteria and was seen in 13 patients (4.1%); among AKI 6 (46.15%) had risk, three patients (23.07%) had injury and 4 (30.7%) had failure and needed peritoneal dialysis. Death occurred in 3 patients (9.6%) in dengue with AKI who had failure. +e incidence of renal manifestations (proteinuria, hematuria, and AKI) is as high as 9.8% among patients with dengue, and those with AKI had significant morbidity and mortality.

We found that mean serum creatinine (μmol/L) level was 180 and 90.2, serum Na (mmol/L) was 132.4 and 132.1, serum K (mmol/L) was 3.95 and 3.65, leucocytes (×109 /L) was 5.12 and 5.34 and platelet (×109 /L) count was 83.4 and 92.5 in patients with renal involvement and without renal involvement respectively (P> 0.05). Proteinuria + was present in 6, ++ in 2, +++ in 2 and in nephrotic range in 1 patient.

The febrile phase involves high fevers, frequently over 40°C (104°F) and associated with generalized pain and a headache; this usually lasts 2–7 days. Flushed skin and some small red spots called petechiae, which are caused by broken capillaries, may occur at this point. The critical phase, if it occurs, follows the resolution of the high fever and typically lasts one to two days.[11] During this phase there may be significant fluid accumulation in the chest and abdominal cavity due to increased capillary permeability and leakage. This leads to depletion of fluid from the circulation and organs. During this phase, organ dysfunction and severe bleeding (Typically from the gastrointestinal tract) may occur. Shock and hemorrhage occur in less than 5% of all cases of dengue but those who have previously been infected with other serotypes of dengue virus ("Secondary infection") have an increased risk of this.[12]

CONCLUSION

Authors found that renal involvement in children with dengue is not uncommon. A thorough clinical and laboratory investigations may be helpful in preventing renal involvement.

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