VARIATION IN RENAL PARAMETERS IN DENGUE AND NON-DENGUE PATIENTS

Abstract

Background: Dengue virus infection (DVI) is a vector-transmitted illness that is widespread in tropical and subtropical locales. Dengue infection has been linked to numerous renal completely such as proteinuria, glomerulonephritis, and acute kidney injury (AKI), which have been documented to occur concurrently with or immediately following acute dengue infection. The purpose of the study was the variation in renal parameters in dengue and non-dengue patients.

Methods: The retrospective study conducted at cooperative hospital in Vadakara, Kerala in India. Total 100 samples collected (50 dengue patients and 50Non dengue patients). All dengue patients were identified by registration number using hospital record management system. Patients admitted with primary and confirmed diagnosis of DVI, irrespective of severity were included in this study. The investigation of the study was to compare urea, uric acid, creatinine, and serum electrolyte levels in dengue patients and non-dengue patients. The analysis was performed within 24 hours after collection with the help of ABBOTT ARCHITECT 4100 Analyzer.

Results: In this study 100samples were taken; 50were selected as dengue patients and 50 were selected as non-dengue patients. It has drastically expanded urea and creatinine in dengue patients compared with non-dengue sufferers. Serum electrolytes showed slightly decreased in dengue patients compared with non-dengue sufferers.

Conclusion: The observed change in creatinine and urea increases in dengue patients compared to non-dengue patients. Sodium, potassium and chloride are almost reduced in dengue patients compared to non-dengue patients. Therefore, we can predict acute kidney injury by evaluating the kidney characteristics of dengue patients.

Keywords: Acute kidney injury (AKI).Dengue fever or DHF/DSS, thrombocytopenia.

INTRODUCTION

Dengue disease is a mosquito- borne contamination especially normal in the tropics and subtropics and is taken into consideration a prime worldwide fitness hazard by means of the sector health enterprise (WHO). It is believed that >50 million people residing in tropical areas worldwide are infected with the dengue virus every year and that >2.5 billion people reside in areas in which

dengue is endemic. The incidence of dengue has increased 30-fold in the past 50 years, extending into countries that were previously disease free [1].
The dengue virus is an RNA virus from the genus Flaviviridae which is transmitted by the bite of Aedcs aegypti mosquito. There are four serotypes of dengue virus; infection with one serotype produces lifelong immunity to that serotype, but the immunity lasts only a few months for other serotypes.
The dengue infection has a hatching time of 3-14[2] days. DVI is appeared by various clinical introductions including asymptomatic disease, undifferentiated fever, dengue fever (DF), dengue hemorrhagic fever (DHF), and life- compromising dengue shock disorder (DSS). Like other tropical diseases, DVI is related with numerous organ brokenness including liver, muscles, heart, cerebrum, and kidneys.[3],[4] DVI has been related with various renal signs like proteinuria, hematuria, glomerulonephritis, and intense kidney injury (MU), which have been accounted for during or soon after intense dengue contamination, The rate of the above renal appearances differs somewhere in the range of 17% and 62% in patients with DV1[5] Intense Renal Disappointment (RF) is an uncommon however very much perceived difficulty of Dengue Disease . This is a review concentrate on varieties in various renal boundaries in dengue patients. [6]

MATERIALS AND METHODS

This was a retrospective study with a cross- sectional design. The Study conducted at cooperative hospital in Vadakara, Kerala.
The data was analyzed between October 2023 to December 2023.Data were collected from the electronic medical records. Total 100 samples collected (50 Dengue patients and 50 Non-dengue patients).
Inclusion criteria; Patients of every age group were included. Patients aged <20years, admitted with primary and confirmed diagnosis of DVI, irrespective of severity were included in this study. Patients having incomplete demographics and hospital stay <48 h were excluded from the study. Both male and female who are examined. Suspected DVI cases were diagnosed by using at least one of the following criteria: 1. Positive reverse transcriptase polymerase chain reaction. 2.Presence of dengue immunoglobulin M and G antibodies in acute-phase serum by enzyme-linked immunosorbent assay. The serum samples were also tested for dengue- specific NS1 antigen. The analysis was performed within 24 hours after collection with the help of ABBOTT ARCHITECT 4100 Analyzer.

STATISTICAL ANALYSIS

The collected data were summarized by using the Descriptive Statistics: frequency, mean and S.D. The Independent sample “t” test was used to compare urea, uric acid, creatinine and serum electrolytes between dengue and non-dengue cases. The “t” test was used to find out the renal function test according to gender. The p value < 0.05 was considered as significant. Data were analyzed by using the SPSS software (SPSS Inc.; Chicago, IL) version 29.0.10.

RESULTS AND DISCUSSION

Figure 1: Study group

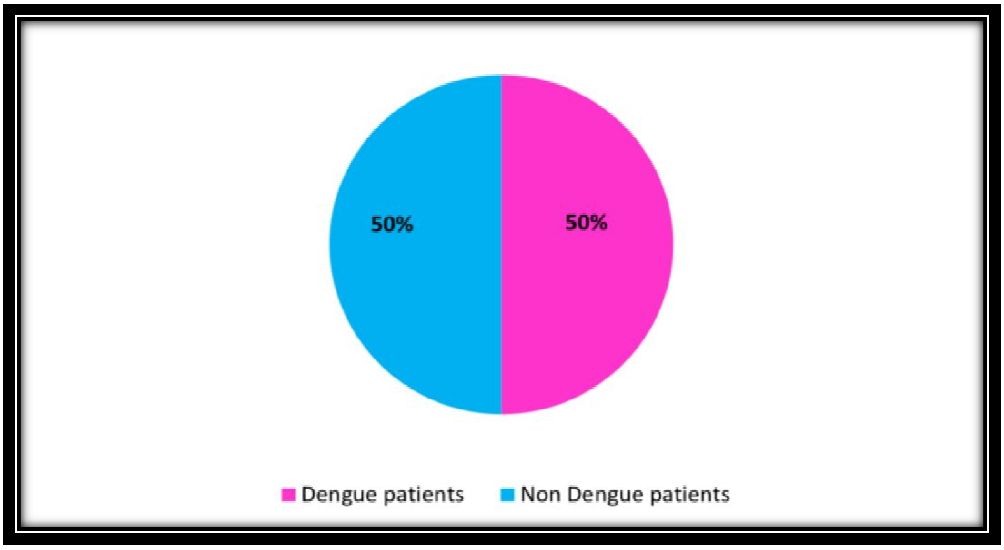


Table 1: Comparison of urea, uric acid, creatinine and serum electrolytes between dengue and non-dengue cases

		Mean	S.D.	"t"	pvalue
Urea(mg/dl)	Denguepatients	68.78	35.70	7.43	<0.001*
	NonDenguepatients	23.14	6.95		
Creatinine(mg/dl)	Denguepatients	2.41	1.78	5.64	<0.001*
	NonDenguepatients	0.83	0.20		
Uricacid(mg/dl)	Denguepatients	5.48	2.26	0.08	0.940
	NonDenguepatients	5.44	1.14		
Sodium(mEq/l)	Denguepatients	130.45	4.16	-11.82	<0.001*
	NonDenguepatients	139.05	2.39		
Potassium(mEq/l)	Denguepatients	3.27	0.46	-7.28	<0.001*
	NonDenguepatients	3.98	0.43		
Chloride(mEq/l)	Denguepatients	92.88	4.54	-9.43	<0.001*
	NonDenguepatients	102.06	2.85		

(“t”=Independentsample“t”test;*Significant)

The Independent sample “t” test was used to compare urea, uric acid, creatinine and serum electrolytes between dengue and non-dengue cases. There was a difference ($p < 0.05$) in urea, creatinine and serum electrolytes between dengue and non-dengue cases. [Table – 1]

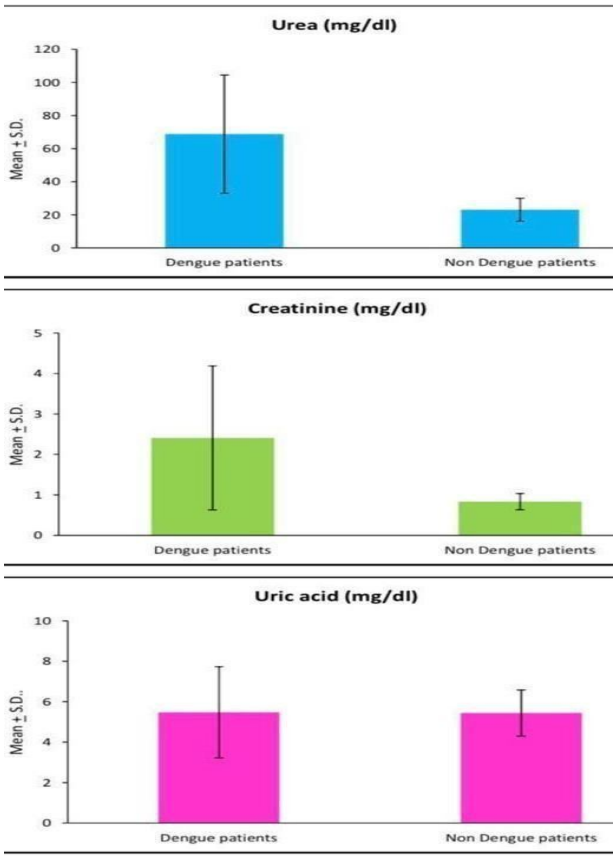
Table2:Comparisonofurea,uricacid,creatinineandserumelectrolytesaccordingtogender

		Mean	S.D.	"t"	pvalue
Urea(mg/dl)	Male	52.92	39.17	2.25	0.027*
	Female	33.96	17.62		
Creatinine(mg/dl)	Male	2.08	1.73	3.75	<0.001*
	Female	0.90	0.37		
Uricacid(mg/dl)	Male	5.78	1.90	1.99	0.051
	Female	4.86	1.22		
Sodium(mEq/l)	Male	135.21	5.30	0.77	0.444
	Female	134.27	5.76		
Potassium(mEq/l)	Male	3.64	0.52	-0.09	0.930
	Female	3.65	0.64		
Chloride(mEq/l)	Male	97.94	5.68	-0.26	0.794
	Female	98.36	6.25		

("t" =Independent sample"t" test;* Significant)

The Independent sample "t" test was used to compare urea, uric acid, creatinine and serum electrolytes according to gender. There was a difference ($p < 0.05$) in urea as well as creatinine between males and females. [Table – 2]

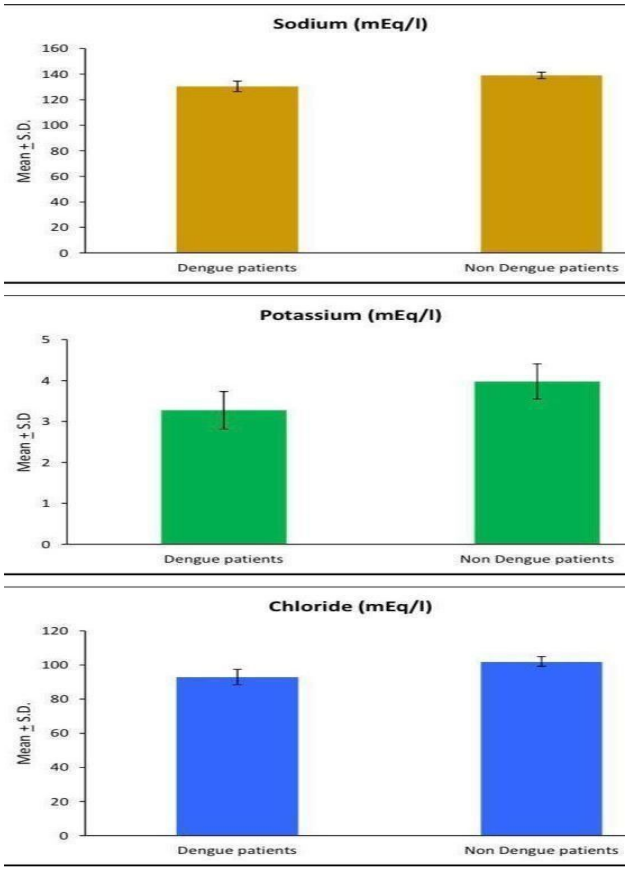
Graph 1: Graph shows the comparison between renal parameters in dengue and non-dengue cases.



According to the graph, dengue patients had significantly higher urea and creatinine levels than non-dengue patients. Uric acid levels do not differ significantly between dengue and non-dengue patients.

The graph indicate they are statistically significant to the study (p value<0.05 for urea and creatinine).

Graph 2:Graph shows the comparison between serum electrolytes in dengue and non-dengue cases



According to the graph, dengue patients had slightly decreased sodium, potassium and chloride than non-dengue patients.The results of the study are statistically significant (p value<0.05 for serum electrolytes).

Discussion

The retrospective study evaluated various renal parameters in dengue patients compared to non-dengue patients. Out of 100 samples collected, 50 were from dengue patients and 50 were from non-dengue patients. Creatinine and urea levels were significantly higher in dengue patients than non-dengue patients. Sodium, potassium, and chloride levels were slightly lower in dengue patients compared to non-dengue patients. Uric acid levels did not significantly differ between dengue and non-dengue patients.
Retrospective investigations of dengue case series have showed that developing AKI was related with a longer hospital stay and a greater fatality rate.

AKI (acute kidney injury) is a complication of dengue infection, according to a previous study by Mahesh Eswarappa et al(2019) on renal symptoms of dengue virus infections. The results of my investigation are consistent with earlier studies on "Acute Renal Failure in Dengue Infection" that were published in the Journal of Clinical and Diagnostic Research. According to that study, severe disseminated intravascular coagulation, hypotension, rhabdomyolysis, hemolysis, and widespread capillary leakage are the main causes of acute renal failure in dengue infections. Numerous case reports have observed that these conditions result in hypoxia, ischemia, and numerous organ dysfunction. Acute tubular necrosis accompanied by interstitial edema and mononuclear cell infiltration may also occur in certain cases. Have an impact on renal failure. Even in patients with dengue fever who do not experience bleeding or hypotension, the precise processes by which the dengue virus directly affects the kidneys are yet unknown. Similarly, up to 74% of patients with dengue hemorrhagic fever had proteinuria, according to a study on "Dengue-Associated Kidney Disease" by Karlo J. Lizarragal and Ali Nayer. They described a 22-year-old lady whose serum creatinine was initially 1.0 mg/dL and who had a confirmed dengue infection.

The majority of the patients in our study were men, suggesting that men are more likely than women to experience this condition. These findings were in line with research by Khalil et al. in which AKI was independently predicted by male gender.

CONCLUSION

The study examined the differences in renal parameters between dengue patients and non- dengue patients. It was observed that creatinine and urea levels were higher in dengue patients compared to non-dengue patients. sodium, potassium, and chloride levels were slightly lower in dengue patients than in non-dengue patients. Uric acid levels showed no significant change between the two groups. In conclusion, the study suggests that renal complications from dengue infections are generally mild. However, some patients may experience more severe renal damage, potentially resulting in acute renal failure. This highlights acute renal failure as a possible complication of dengue infections. Predicting the onset of acute kidney injury in dengue patients may be achievable by evaluating their renal function tests.

Informed consent

Written informed consent was taken from each participant before enrollment.

REFERENCES

1.↑ Bhatt S et al., 2013. The global distribution and burden of dengue. Nature 496: 504–507.
PubMed
Search Google Scholar
Export Citation
2.↑ Wilder-Smith A, Ooi EE, Horstick O, Wills B, 2019. Dengue. Lancet 393: 350–363.
PubMed
Search Google Scholar
Export Citation
3.↑ World Health Organization , 2009. Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control, new edition. Geneva, Switzerland: WHO.

PubMed
Search Google Scholar
Export Citation

4.↑ Surasombatpattana S, Sangthawan P, Hortiwakul T, Charoenmak B, Chusri S, 2021. Characteristics and outcomes of adults hospitalized with dengue viral infection and acute kidney injury in southern Thailand. Am J Trop Med Hyg 105: 425–434.
PubMed
Search Google Scholar
Export Citation
5.↑ Huy BV, Thuy DT, 2020. Prevalence, characteristics, and factors associated with acute kidney injury among adult dengue patients in Vietnam. Am J Trop Med Hyg 104: 1067–1071.
PubMed
Search Google Scholar
Export Citation
6.↑ Diptyanusa A, Phumratanaprapin W, 2021. Predictors and outcomes of dengue-associated acute kidney injury. Am J Trop Med Hyg 105: 24–30.
PubMed
Search Google Scholar
Export Citation
7.↑ Laoprasopwattana KM, Pruekprasert PM, Dissaneewate PM, Geater AP, Vachvanichsanong PM, 2010. Outcome of dengue hemorrhagic fever-caused acute kidney injury in Thai children. J Pediatr 157: 303–309.
PubMed
Search Google Scholar
Export Citation
8.↑ Basu G, Chrispal A, Boorugu H, Gopinath KG, Chandy S, Prakash JA, Thomas K, Abraham AM, John GT, 2011. Acute kidney injury in tropical acute febrile illness in a tertiary care centre—RIFLE criteria validation. Nephrol Dial Transplant 26: 524–531.
PubMed
Search Google Scholar
Export Citation
9.↑ Lee IK, Liu JW, Yang KD, 2009. Clinical characteristics, risk factors, and outcomes in adults experiencing dengue hemorrhagic fever complicated with acute renal failure. Am J Trop Med Hyg 80: 651–655.
PubMed
Search Google Scholar
Export Citation
10.↑ Mallhi TH, Khan AH, Adnan AS, Sarriff A, Khan YH, Jummaat F, 2015. Incidence, characteristics and risk factors of acute kidney injury among dengue patients: a retrospective analysis. PLoS One 10: e0138465.
PubMed
Search Google Scholar
Export Citation

11.↑ Diptyanusa A, Phumratanaprapin W, Phonrat B, Poovorawan K, Hanboonkunupakarn B, Sriboonvorakul N, Thisyakorn U, 2019. Characteristics and associated factors of acute kidney injury among adult dengue patients: a retrospective single-center study. PLoS One 14: e0210360.
PubMed
Search Google Scholar
Export Citation
12.↑ Patel M, Himanshu D, Chaudhary S, Atam V, Sachan R, Misra R, Mohapatra S, 2019. Clinical characteristic and risk factors of acute kidney injury among dengue viral infections in adults: a retrospective analysis. Indian J Nephrol 29: 15–21.
PubMed
Search Google Scholar
Export Citation
13.↑ Eswarappa M, Reddy SB, John MM, Suryadevara S, Madhyashatha RP, 2019. Renal manifestations of dengue viral infection. Saudi J Kidney Dis Transpl 30: 394–400.
PubMed
Search Google Scholar
Export Citation
14.↑ Dussart P et al., 2020. Comparison of dengue case classification schemes and evaluation of biological changes in different dengue clinical patterns in a longitudinal follow-up of hospitalized children in Cambodia. PLoSNegl Trop Dis 14: e0008603.
PubMed
Search Google Scholar
Export Citation
15.↑ Chertow GM, Burdick E, Honour M, Bonventre JV, Bates DW, 2005. Acute kidney injury, mortality, length of stay, and costs in hospitalized patients. J Am Soc Nephrol 16: 3365–3370.
PubMed
Search Google Scholar
Export Citation
16.↑ Coca SG, Singanamala S, Parikh CR, 2012. Chronic kidney disease after acute kidney injury: a systematic review and meta-analysis. Kidney Int 81: 442–448.
PubMed
Search Google Scholar
Export Citation
17.↑ Kaddourah A, Basu RK, Bagshaw SM, Goldstein SL, 2017. Epidemiology of acute kidney injury in critically ill children and young adults. N Engl J Med 376: 11–20.
PubMed
Search Google Scholar
Export Citation
18.↑ Li D et al., 2023. The whole-genome sequencing of prevalent DENV-1 strains during the largest dengue virus outbreak in Xishuangbanna Dai Autonomous Prefecture in 2019. J Med Virol 95: e28115.
PubMed
Search Google Scholar
Export Citation

19.↑ Wu W, Ren H, Lu L, 2021. Increasingly expanded future risk of dengue fever in the Pearl River Delta, China. PLoSNegl Trop Dis 15: e0009745.
PubMed
Search Google Scholar
Export Citation
20.↑ Chang K et al., 2017. Differences in mortality and clinical manifestations of dengue hemorrhagic fever in Taiwan in different years: a comparison for cases in 2014 and 2015 epidemics. Am J Trop Med Hyg 97: 361–368.
PubMed
Search Google Scholar
Export Citation
21.↑ Hong HW et al., 2022. Clinical features of adult patients with severe dengue in Guangdong Province from 2013 to 2019. Chin J Infect Dis 40: 13–19.
PubMed
Search Google Scholar
Export Citation
22.↑ Zhang FC et al., 2011. Guidelines for the diagnosis and treatment of dengue in China. Infect Dis Immun 1: 144–152.
PubMed
Search Google Scholar
Export Citation
23.↑ Khwaja A, 2012. KDIGO clinical practice guidelines for acute kidney injury. Nephron Clin Pract 120: c179–c184.
PubMed
Search Google Scholar
Export Citation
24.↑ National Kidney Foundation , 2002. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation classification stratification. Am J Kidney Dis 39: S1–S266.
PubMed
Search Google Scholar
Export Citation
25.↑ Charlson ME, Pompei P, Ales KL, MacKenzie CR, 1987. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis 40: 373–383.
PubMed
Search Google Scholar
Export Citation
26.↑ Mallhi TH, Khan AH, Sarriff A, Adnan AS, Khan YH, Jummaat F, 2016. Defining acute kidney injury in dengue viral infection by conventional and novel classification systems (AKIN and RIFLE): a comparative analysis. Postgrad Med J 92: 78–86.
PubMed
Search Google Scholar
Export Citation

27.↑ Er RE, Okyay GU, Kmaz B, Türko GA, Lu M, Erten Y, 2020. Comparison between RIFLE, AKIN, and KDIGO: acute kidney injury definition criteria for prediction of in-hospital mortality in critically ill patients. Iran J Kidney Dis 14: 365–372.
PubMed
Search Google Scholar
Export Citation
28.↑ Tsai TY, Chien H, Tsai FC, Pan HC, Yang HY, Lee SY, Hsu HH, Fang JT, Yang CW, Chen YC, 2017. Comparison of RIFLE, AKIN, and KDIGO classifications for assessing prognosis of patients on extracorporeal membrane oxygenation. J Formos Med Assoc 116: 844–851.
PubMed
Search Google Scholar
Export Citation
29.↑ Jung JY et al., 2011. Acute kidney injury in critically ill patients with pandemic influenza A pneumonia 2009 in Korea: a multicenter study. J Crit Care 26: 577–585.
PubMed
Search Google Scholar
Export Citation
30.↑ Argyropoulos A, Townley S, Upton PM, Dickinson S, Pollard AS, 2019. Identifying on admission patients likely to develop acute kidney injury in hospital. BMC Nephrol 20: 56.
PubMed
Search Google Scholar
Export Citation