



Variation in Renal Parameters in Dengue and Non-dengue Patients

Anuja. K ^{a++}, Riya V P ^{b#}, Sona Valsaraj ^{b#}
and Bineesh C P ^{a†*}

^a Department of Medical Biochemistry, Co-operative Institute of Health Sciences, Thalassery, Kerala, India.

^b Department of Biochemistry, Mahe Institute of Dental Sciences & Hospital, Chalakkara, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: <https://doi.org/10.9734/jammr/2024/v36i115618>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/114359>

Original Research Article

Received: 11/01/2024

Accepted: 13/03/2024

Published: 18/10/2024

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 50 Non 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.

⁺⁺ Student;

[#] Lecturer;

[†] Associate Professor;

*Corresponding author: E-mail: bineeshcp87@gmail.com;

Cite as: K, Anuja., Riya V P, Sona Valsaraj, and Bineesh C P. 2024. "Variation in Renal Parameters in Dengue and Non-Dengue Patients". *Journal of Advances in Medicine and Medical Research* 36 (11):61-67. <https://doi.org/10.9734/jammr/2024/v36i115618>.

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 100 samples were taken; 50 were 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.

1. 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 *Aedes 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” [2].

The dengue infection has a hatching time of 3-14 [3] 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” [4,5]. “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 [6] 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” [7].

2. 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 < 20 years, 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.

3. 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.

4. RESULTS AND DISCUSSION

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).

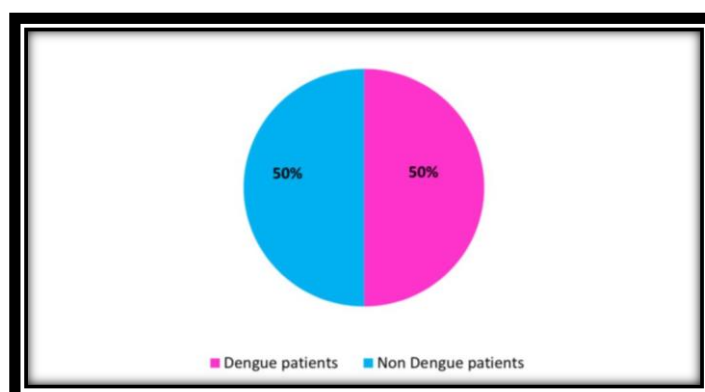


Fig. 1. Study group

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

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

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

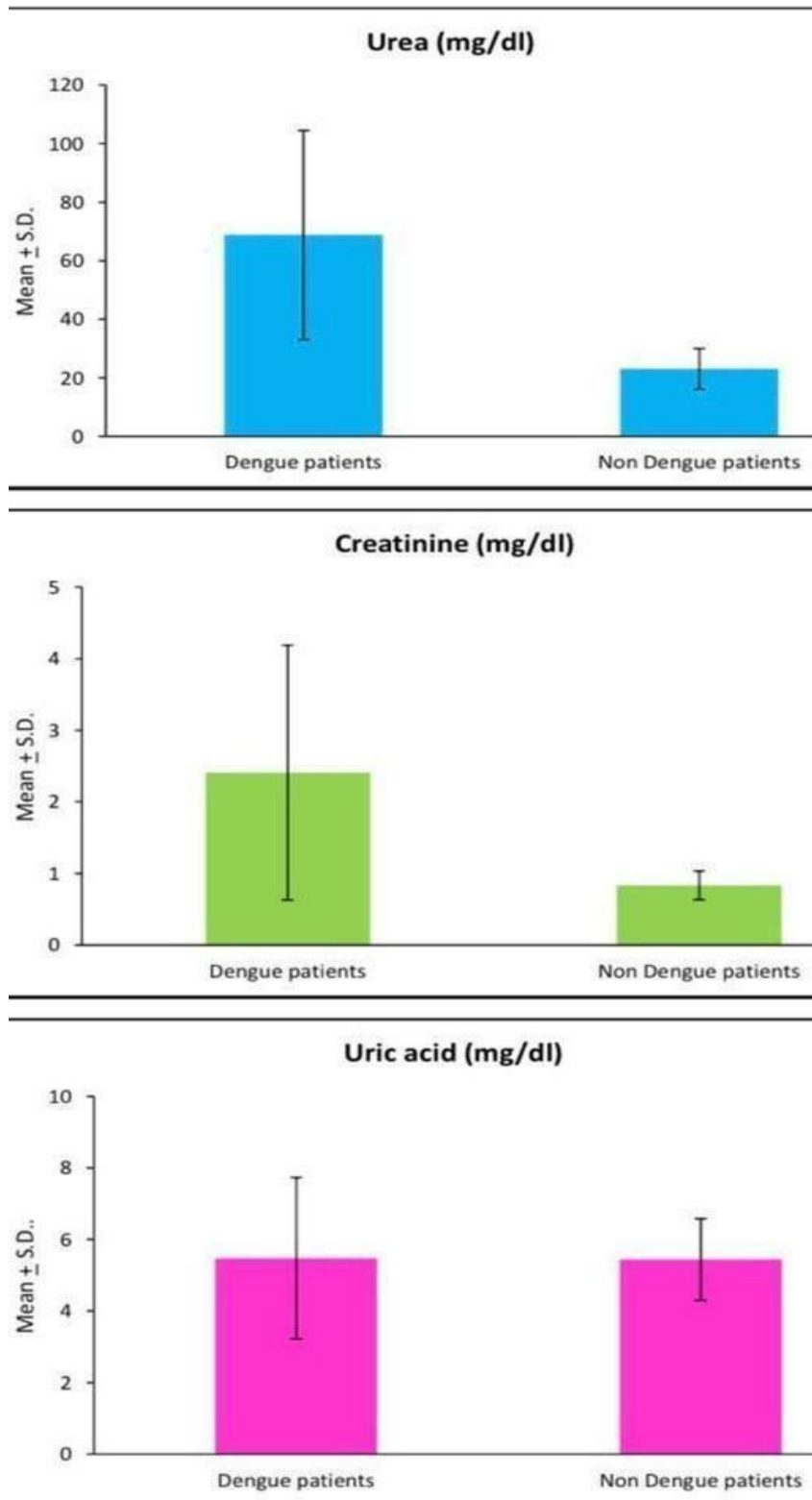
The Independent sample "t" test was used to compare urea, uric acid, creatinine and serum electrolytes between dengue and non-dengue cases. There was a difference (p < 0.05) in urea, creatinine and serum electrolytes between dengue and non-dengue cases. [Table 1]

Table 2. Comparison of urea, uric acid, creatinine and serum electrolytes according to gender

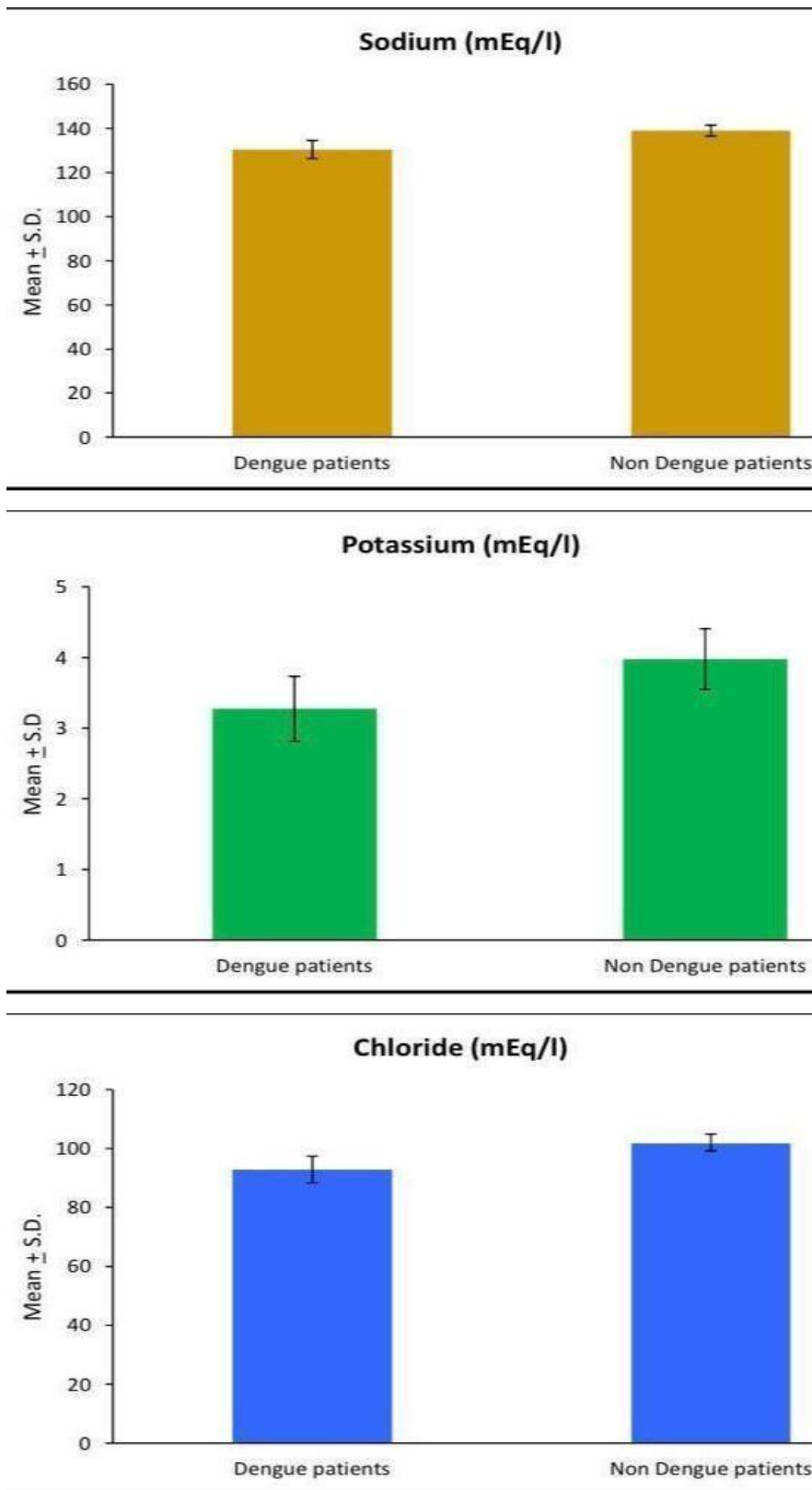
		Mean	S.D.	"t"	p value
Urea (mg/dl)	Male	52.92	39.17	2.25	0.027*
	Female	33.96	17.62		
Creatinine (mg/dl)	Male	2.08	1.73	3.75	< 0.001*
	Female	0.90	0.37		
Uric acid (mg/dl)	Male	5.78	1.90	1.99	0.051
	Female	4.86	1.22		
Sodium (mEq/l)	Male	135.21	5.30	0.77	0.444
	Female	134.27	5.76		
Potassium (mEq/l)	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



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).

5. 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 [8] 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 [9] 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. [10] in which AKI was independently predicted by male gender.

6. 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.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

INFORMED CONSENT

Written informed consent was taken from each participant before enrollment.

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

I appreciate Department of Medical Biochemistry Co-operative Institute of Health Sciences, Thalassery and Co-operative hospital Vadakara, Kerala.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Bhatt S et al. The global distribution and burden of dengue. Nature. 2013;496:504–507.

- PubMed
Search Google Scholar
Export Citation
- 2 .Lima EQ, Nogueira ML. Viral hemorrhagic fever-induced acute kidney injury. *Semin Nephrol.* 2008;28(4):409–15
PubMed
- 3 Wilder-Smith A, Ooi EE, Horstick O, Wills B. Dengue. *Lancet.* 2019;393:350–363.
PubMed
Search Google Scholar
Export Citation
- 4 World Health Organization. Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control, new edition. Geneva, Switzerland: WHO; 2009.
PubMed
Search Google Scholar
Export Citation
- 5 Surasombatpattana S, Sangthawan P, Hortiwakul T, Charoenmak B, Chusri S. Characteristics and outcomes of adults hospitalized with dengue viral infection and acute kidney injury in southern Thailand. *Am J Trop Med Hyg.* 2021;105:425–434.
PubMed
Search Google Scholar
Export Citation
- 6 Huy BV, Thuy DT, Prevalence, characteristics, and factors associated with acute kidney injury among adult dengue patients in Vietnam. *Am J Trop Med Hyg.* 2020;104:1067–1071.
PubMed
Search Google Scholar
Export Citation
- 7 Diptyanusa A, Phumratanaprapin W. Predictors and outcomes of dengue-associated acute kidney injury. *Am J Trop Med Hyg.* 2021;105:24–30.
PubMed
Search Google Scholar
Export Citation
- 8 Eswarappa M, Reddy S, John M, Suryadevara S, Madhyashatha R. Renal manifestations of dengue viral infection. *Saudi Journal of Kidney Diseases and Transplantation.* 2019;30(2):394–400.
- 9 Lizarraga KJ, Nayer A. Dengue-associated kidney disease. *Journal of Nephropathology.* 2014; 3:57–62.
- 10 Khalil MAM, Sarwar S, Chaudry MA, et al., Acute kidney injury in dengue virus infection. *Clinical Kidney Journal.* 2012;5(5):390–394.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle5.com/review-history/114359>