

# SPECTRUM OF RADIOLOGICAL FINDINGS IN DENGUE FEVER

Bibi Khufsa, Maria Rauf, Sidra Qadir, Ayesha Amin

Department of Radiology, Maroof International Hospital, Islamabad, Pakistan

PJR April - June 2023; 33(2): 67-71

## ABSTRACT

**AIMS:** Dengue fever is one of the major mosquito born infection which emerges as epidemic and poses a great threat to public health in Asian population especially Pakistan. The symptomatic presentation of dengue fever ranges from febrile illness or fatal presentations including dengue shock syndrome or dengue hemorrhagic fever. The spectrum of radiological findings in dengue fever varies from hepatosplenomegaly to massive hemorrhages. Therefore, the aim of this study was to evaluate the spectrum of radiological findings in dengue serology positive patients so that presence of certain imaging features on radiological investigations must raise the suspicion of dengue fever even in the absence of serological tests. **MATERIAL AND METHODS:** About 200 patients with complaints of fever having positive dengue serology and radiological investigations including ultrasound abdomen and / or CT scan were enrolled in our study from January 1<sup>st</sup> 2022 till October 30<sup>th</sup> 2022. **RESULTS:** The most common radiological finding in our study was gall bladder wall edema, followed by ascites, hepatomegaly, splenomegaly and pleural effusions. Hemorrhagic complications were rare. **CONCLUSION:** A myriad of presentations is associated with dengue fever. Imaging modalities particularly ultrasound and CT scan can be utilized to detect readily the features and complications of dengue fever in emergency condition even if there is absence or delay in serological tests.

## Introduction

Dengue fever is one of the major mosquito born infection which emerges as epidemic and poses a great threat to public health in Asian population especially Pakistan. The species attributed to it include *Aedes aegypti* and *Aedes albopictus*.<sup>1</sup> Due to climate change and urbanization, majority of cases of dengue fever are reported in Asia and accounts for 10,000 deaths per year worldwide.<sup>2</sup> Approximately 25,932 confirmed cases of dengue fever were reported in Pakistan in the year 2022 among which 62 patients died of dengue fever thus emerging as a major health care problem in Pakistan.<sup>3</sup> Therefore, radical steps need to be taken to control infection and transmission rate including community awareness, measure for vector control and steps for early diagnosis and management of dengue fever and related complications.

The symptomatic presentation of dengue fever ranges from febrile illness or fatal presentations including dengue shock syndrome or dengue hemorrhagic fever.<sup>4</sup> The spectrum of radiological findings in dengue fever varies from hepatosplenomegaly to massive hemorrhages. Therefore, the aim of this study was to evaluate the spectrum of radiological findings in dengue serology positive patients so that presence of certain images features on radiological investigations must raise the suspicion of dengue fever even in the absence of serological tests.

## Material and Methods

This retrospective study was performed after approval from our Institutional review board (IRB) and informed

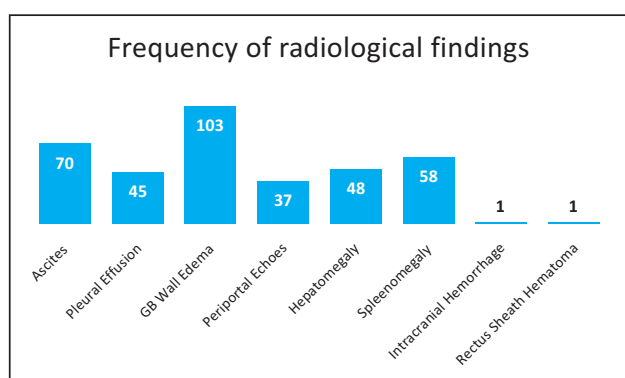
**Correspondence :** Dr. Maria Rauf  
Department of Radiology,  
Maroof International Hospital,  
Islamabad, Pakistan  
Email: mari23392@gmail.com

Submitted 4 June 2023, Accepted 13 June 2023

written consent was waived off. All the patients presenting to emergency department from January 1<sup>st</sup> 2022 till October 30<sup>th</sup> 2022 with complaints of fever having positive dengue serology and radiological investigations including ultrasound abdomen and / or CT scan were enrolled in our study. Total 200 patients fulfilled the criterion. Patients demographics including age and gender were retrieved from hospital information system HIS. Ultrasound scan were performed on Mindray DC 70 ultrasound machine. CT scans were performed on GE 64 slice VCT light speed CT scanner. Ultrasound and CT scan images were reviewed on workstation. Data was collected and analyzed on SPSS version 27 and displayed as frequency percentages.

## Results

There were 135 (67.5%) males and 65 (32.5%) females with age ranging from 15 years to 65 years. Severe presentation of dengue fever including thrombocytopenia were noted 65/200 (32.5%) while mild clinical presentation was noted in 135/200 (67.5%). The most common radiological finding in our study was gall bladder wall edema which was seen in 103/200 (51.5%) as in (Fig.1). Followed by ascites which was present in 70/200 (35%). Hepatomegaly was present in 48/200 (24%), splenomegaly in 58/200 (28.5%) and pleural effusion which was noted in 45/200 (22.5%). Hemorrhagic complications were rare and incidence of both intracranial hemorrhage and rectus sheath hematoma was 1/200 (0.5%). This is shown in (Fig.1).



**Figure 1:** Graphical representation of frequency of spectrum of radiological findings in dengue fever.

## Discussion

Dengue fever has been labelled as an endemic infection by world health organization (WHO) posing threat to public health in about more than 100 countries worldwide. About 100 million people suffer annually from dengue fever.<sup>5</sup> Dengue has now become one of the most common endemic infections in Pakistan particularly in post moonsoon period and the situation has been aggravated by recent flood leading to plenty of carrier vectors i.e., mosquitoes particularly *Aedes aegypti*. The common laboratory investigations carried out for dengue fever include PCR assay, ELISAs, immunofluorescence assays and hemagglutination tests.<sup>6</sup> Apart from typical clinical presentation and serological test, radiological imaging including radiograph chest, ultrasound and CT scan has important role not only in diagnosing the disease but to exclude associated complications.<sup>7</sup> The pathogenesis behind majority of complications associated with dengue fever is attributed to increase in vascular permeability resulting in leakage of plasma from capillary membranes and fluid accumulation in third space.<sup>8</sup> Multisystem involvement is often seen in dengue fever affecting gastro-intestinal system, renal system, musculoskeletal and central nervous system.

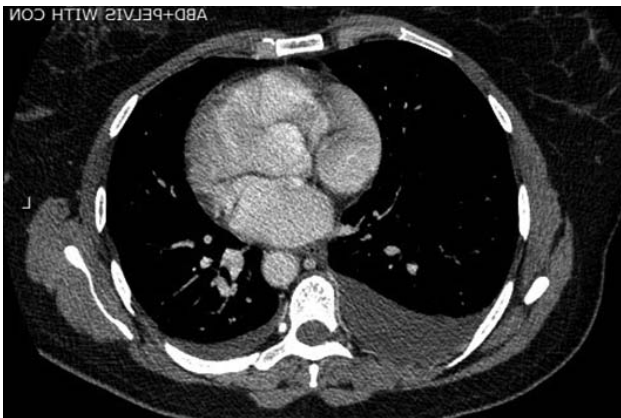
In our observation, the commonest radiological finding associated with dengue fever was gall bladder wall thickening (more than 3 mm) and edema which was present in 103 patients (51.5%) of the total cases as in (Fig.2). Among severe dengue patients out of 65, 60 patients showed gall bladder wall thickening making 92.3%. while in 135 patients with mild dengue fever gall bladder wall thickening was seen in 43 patients making it 31.8%. This observation is consistent with a study performed by M.W. Setiawan et al<sup>9</sup> who reported gall bladder wall thickening in 94% patients with severe dengue fever and in mild cases of dengue prevalence was 33%.

The next common complication noted in our study was ascites with prevalence of 35%. Many studies previously published have found ascites to be the most common manifestation of dengue fever and occurs due to plasma leakage. A study by Setiawan MW et al concluded ascites was present in 26 % only of mild dengue cases and 94 % in that of severe cases.<sup>10</sup> Pleural effusions due to plasma leakage were seen in up to 22.5% patients in our study shown



**Figure 2:** Ultrasound abdomen image showing gall bladder wall edema.

in (Fig.3). A positive association of pleural effusion with severity of dengue fever was noted and is concordant with multiple studies in literature; the prominent one by Hu et al.<sup>11</sup>



**Figure 3:** Pleural effusions in patient with dengue fever.

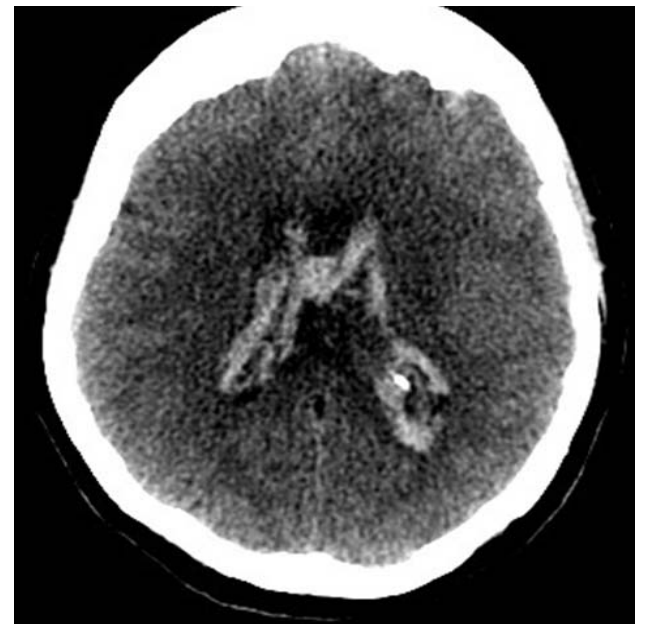
Hepatomegaly was documented in up to 24% in our study. This is relatively infrequent compared to previously performed studies where Shamsi et al documented hepatomegaly in up to 49% of cases.<sup>12</sup> Another study performed in Pakistan reported hepatomegaly in 35.5% cases<sup>1</sup> which is comparable to our observation. The other finding related to liver

was prominent portal triads or periportal echoes. This occurs due to apoptosis leading to mitochondrial inflammation and vacuolar nuclear degeneration of hepatocytes.<sup>13</sup> Prominent periportal echoes are documented mainly in hepatic viral infection however its documentation in association with dengue fever is not abundantly described in literature and scarce data is available.

In our study, the rarest complications included intracranial hemorrhage and bilateral rectus sheath hematoma as shown in (Fig.4 and Fig.5). Combination of multiple factors including low platelet count, dysfunctional platelets, increased fibrinolysis and



**Figure 4:** contrast enhanced axial slice of CT abdomen shows bilateral rectus hematoma with active contrast extravasation.



**Figure 5:** Axial non contrast CT brain image showing intraventricular hemorrhage in dengue positive patient.

high vascular fragility leads to hemorrhages in dengue fever.<sup>14</sup> Intracranial hemorrhage associated with dengue fever is a rare complication and is attributed to multiple factors including coagulopathies, vasculopathies and thrombocytopenia. We observed dengue associated intracranial hemorrhage in 1 patient (0.5%) which is concordant with previously published data.<sup>15</sup> 1 out of 200 patients had bilateral rectus sheath hematomas. This is also one of the rarest complications associated with dengue fever. The limitations of this study included unicentric study and sample size was limited. Further studies with multicentric approach and larger sample size may be conducted to strengthen our results.

## Conclusion

A myriad of presentations is associated with dengue fever. Imaging modalities particularly ultrasound can be utilized to detect readily the features and complications of dengue fever in emergency condition even if there is absence or delay in serological tests.

**Conflict of Interest:** None

## References

1. Hayat D, Sultan A, Adeel Z, Fatima S. Spectrum and Frequency of Imaging Findings in Dengue Fever. *PJMHS* 2020; **14(3)**:1749-51
2. Messina JP, Brady OJ, Golding N, Kraemer MU, Wint GW, Ray SE, et al. The current and future global distribution and population at risk of dengue. *Nat Microbiol.* 2019; **4(9)**:1508-15
3. World Health Organization (13 October 2022). Disease Outbreak News; Dengue - Pakistan. Available at: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON414>
4. A. Kumar, C.R. Rao, V. Pandit, S. Shetty, C. Bamigatti, C.M. Samarasinghe. Clinical manifestations and trend of dengue cases admitted in a tertiary care hospital, Udipi district, Karnataka. *Indian J Community Med* 2010; **35(3)**: 386-90.
5. Dengue Fever World Health Organization Fact Sheet No.117 [<http://www.who.int/mediacentre/factsheets/fs117/en/>] webcite 2009.
6. Butt N, Abbassi A, Munir SM, Ahmad SM, Sheikh QH: Haematological and biochemical indicators for the early diagnosis of dengue viral infection. *J Coll Physicians Surg Pak* 2008; **18(5)**: 282-5.
7. Hasan S, Jamdar SF, Alalowi M, Al Beaiji SM. Dengue virus: A global human threat: Review of literature. *J Int Soc Prevent Comm Dent* 2016; **6(1)**: 1-6.
8. Goldberg BB. Ultrasonic evaluation of intraperitoneal fluid. *JAMA* 1976; **235**: 2427-30.
9. Setiawan MW, Samsi TK, Pool TN. Gallbladder wall thickening in dengue hemorrhagic fever: an ultrasonographic study. *J Clin Ultrasound* 1995; **23**: 357-362.
10. Setiawan MW, Sugianto D, Samsi TK. Ultrasound in fluid collections: the value in the management of dengue hemorrhagic fever. *Proceedings of 3rd Congress of AFSUMB'92, Seoul, Korea 1992*; p 94.
11. Hu T, Liu J, Guan W, Zhang L, Jiang S, Chen B, et al. CT findings of severe dengue fever in the chest and abdomen. *RadInfectDiseases.* 2015; **2(2)**: 77-80
12. Samsi TK, Susanto I. Early diagnosis and the management of dengue hemorrhagic fever. *Proceedings of 2Day Symposium on 20th Anniversary of Pediatric Department, Sumber Waras Hospital, Jakarta, 1987*; pp 75-92.
13. P voa TF, Alves AM, Oliveira CA, Nuovo GJ, Chagas VL, Paes MV. The pathology of severe dengue in multiple organs of human fatal cases: histopathology, ultrastructure and virus replication. *PloS one.* 2014; **9(4)**: e83386
14. Wills BA, Oragui EE, Stephens AC, Daramola OA, Dung NM, Loan HT, et al. Coagulation abnormalities in dengue hemorrhagic fever: Serial investi-

---

gations in 167 Vietnamese children with den-gue shock syndrome. Clin Infect Dis 2002; **35**: 277-85.

15. Singh A, Balasubramanian V, Gupta N. Spontaneous intracranial hemorrhage associated with dengue fever: An emerging concern for general physicians. J Family Med Prim Care. 2018; **7(3)**: 618-28.