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Exploring the Various Radiological Observations and Appearances in Patients with Dengue Fever; A Retrospective Observational Approach

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Authors Contribution

[1,3]Conception, planning of research, analysis writing of manuscript,[2,4,5]Data Collection

Funding Source: None

Conflict of Interest: None

Received: July 21, 2023

Accepted: Dec 04, 2023

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ABSTRACT

Objective: To assess the range of radiological observations in patients testing positive for dengue serology.

Methodology: This retrospective, observational study was conducted at Islamabad Diagnostic Center, Islamabad from September 2022 to March 2023. The Ethical Committee approved this study. All the individuals who arrived at the IDC, Islamabad, complaining of fever and tested positive for dengue serology, from September 2022 to March 2023, were included in our study. A total of 240 patients met these criteria. Patient details, including age and gender, were obtained from the center's computer system.

Results: Severe cases of dengue fever, including thrombocytopenia, were observed in 62 out of 240 patients (25.83%), while mild clinical presentations were noted in rest of the 178 patients (74.16%). The most mutual radiological outcome was wall edema of the gall bladder (figure 2a), seen in 113 out of 240 patients (47.08%). This was followed by ascites (2b), that were observed in 38.33% (n=92) cases. Hepatomegaly was noted in 10.83% (n=26) (2c), splenomegaly in 3.75% (n=9) (2d) respectively.

Conclusion: Dengue fever presents with a variety of manifestations. Imaging techniques, especially ultrasound, can be employed to promptly identify the characteristics and complications of dengue fever in emergency situations, even when serological tests are unavailable or delayed.

Keywords: Dengue Fever, Radiography, Ultrasonography, Computed Tomography, Magnetic Resonance Imaging.

Cite this article as: Malikk N, Aftab SB, Aftab N, Malik MA, Ahmad H. Exploring the Various Radiological Observations and Appearances in Patients with Dengue Fever; A Retrospective Observational Approach. Ann Pak Inst Med Sci. 2023; 19(4): 496-499. doi. 10.48036/apims.v19i4.689.

Introduction

Dengue is a common infection transmitted by mosquitoes that affects people, and it has become a significant global health concern in recent years. People with symptomatic dengue virus infections can experience a variety of clinical symptoms, ranging from a mild fever to a potentially life-threatening shock syndrome.[1] The development of the disease is influenced by both the virus and the individual's factors. It's crucial to recognize the impact of dengue on healthcare, as well as its effects on morbidity and mortality. Timely identification and suspicion of dengue fever in primary care can help mitigate complications when managed appropriately. To address the issue comprehensively, we need to delve into its transmission, clinical presentation, diagnosis, management, and prevention.[2]

The World Health Organization (WHO) has stated that dengue and dengue hemorrhagic fever are prevalent in South Asia. Currently, WHO estimates suggest there could be around 50 million dengue infections worldwide each year. In 2007, the Americas alone reported over 890,000 cases of dengue, with 26,000 of them being Dengue Hemorrhagic Fever (DHF).[3-6]

In approximately 100 nations in Africa, the Americas, the Eastern Mediterranean, South-east Asia, and the Western Pacific, the illness is currently common; the most seriously

doi. 10.48036/apims.v19i4.689

impacted regions are South-east Asia and the Western Pacific.[7,8]

Pakistan is at a high risk of experiencing large-scale epidemics due to factors such as densely populated cities, unsafe drinking water, inadequate sanitation, a significant number of refugees, and low vaccination coverage. These conditions contribute to the spread of infectious diseases, leading to numerous epidemics and outbreaks throughout the country each year, resulting in increased illness and loss of life.[6,7]

The purpose of this research was to assess the range of radiological observations in patients testing positive for dengue serology. The goal is to highlight specific visual patterns in radiological examinations, aiming to prompt consideration of dengue fever even when serological tests are not available.

Methodology

This retrospective, observational study was conducted at Islamabad Diagnostic Center, Islamabad from July 2023 to December 2023. The Ethical Committee approved this study. All the individuals who arrived at the IDC, Islamabad, complaining of fever and tested positive for dengue serology, from January 1st, 2023, to June 30th, 2023, were included in our study. A total of 240 patients met these criteria. Patient details, including age and gender, were obtained from the center's computer system. Ultrasound examinations were conducted using the available 3D realtime ultrasound machine, GE (USA) while CT scans were performed using the "GE 64 slice VCT Lightspeed CT scanner". The ultrasound and CT scan images were carefully examined on a workstation. Data were collected and analyzed using SPSS version 27, and the results are presented as frequency percentages. A pa value less than 0.05 was considered significant.

Results

Out of the 240 patients, 70.0% (n=168) were male, and 30.0% (n=72) were female, with ages ranging from 20 to 68 years with mean age 32.4years. Majority of the patients 79.16% (n=190) were having education higher secondary and above while the rest of the 20.83% (n=50) patients were having education below intermediate level. Out of 240 patients, 80.9% (n=192) were married while only 20% (n=48) were either unmarried or engaged. 209 patients (87.0%) were reported from Islamabad and surroundings while 31 (13.0%) patients were from KP. The demographics characteristics are shown in table I.

Table I: Demographics of the study participants.

Characteristics	N	Percentages
Gender		
Male	168	70.0
Female	72	30.0
Mean age (years)	32.4	
Education		
Below Intermediate	50	20.83
Intermediate & above	190	79.16
Marital Status		
Married	192	80.0
Unmarried/engaged	48	20.0
Area of residence		
Islamabad & Surroundings	209	87.0
KP (Khyber-Pakhtunkhwa)	31	13.0

Severe cases of dengue fever, including thrombocytopenia, were observed in 62 out of 240 patients (25.83%), while mild clinical presentations were noted in rest of the 178 patients (74.16%). The results are displayed in figure 1.

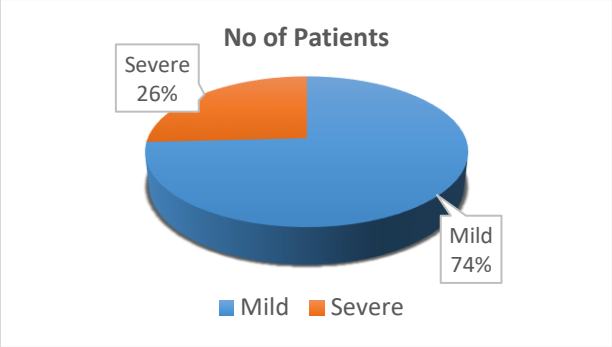

Figure 1. Frequency of disease in the study population

Figure 2a, b, c and d: Common radiological findings in Dengue fever patients

In our study, the most mutual radiological outcome was wall edema of the gall bladder (figure 2a), seen in 113 out of 240 patients (47.08%). This was followed by ascites (2b), that were observed in 38.33% (n=92) cases. Hepatomegaly was noted in 10.83% (n=26) (2c), splenomegaly in 3.75% (n=9) (2d) respectively.

Hemorrhagic complications were rare, with the incidence of both intracranial hemorrhage and rectus sheath hematoma being 4 out of 240 patients (1.66%). The results are mentioned in 5a,b respectively.

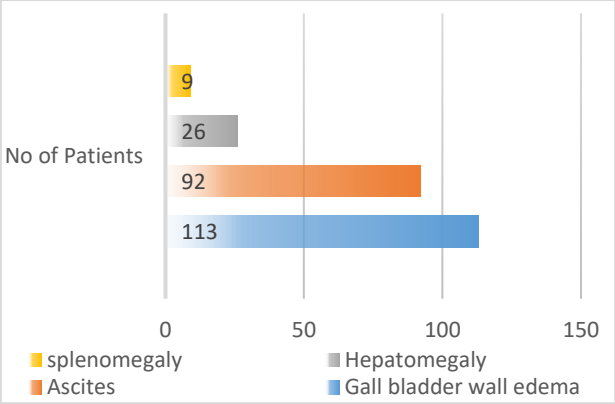

Figure 3. Most common radiological outcomes of the study

Figure 5a showing bilateral rectus hematoma with active contrast extravasation

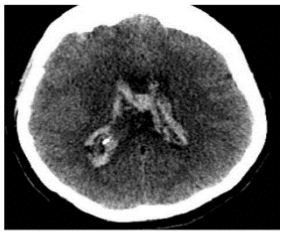

Figure 5b showing g intraventricular hemorrhage in dengue positive patient

Discussion

Dengue fever, recognized as an endemic infection by the World Health Organization (WHO), poses a significant threat to public health in over 100 countries globally. Approximately 100 million people endure the impact of dengue fever each year.[5] In Pakistan, the prevalence of dengue has risen notably, particularly after the monsoon season, and recent floods have exacerbated the situation by creating favorable conditions for mosquito carriers, especially *Aedes aegypti*.

Standard laboratory investigations for dengue fever involve ELISAs, immunofluorescence assays, PCR assays, and hemagglutination tests etc.[6] Beyond the typical clinical presentation and serological tests, radiology imaging, including ultrasound, chest radiographs, and CT scans, plays a crucial role not only in identifying the disease but also in ruling out accompanying difficulties.

The etiology of many difficulties linked to dengue fever is ascribed to an upsurge in vessels penetrability, leading to plasma leak from capillary membranes and the accumulation of fluid in the third space. Dengue fever often manifests as a multisystem involvement, affecting the gastrointestinal, renal, musculoskeletal, and central nervous systems.[8]

In the current study, severe cases of dengue fever, including thrombocytopenia, were observed in 62 out of 240 patients (25.83%), while mild clinical presentations were noted in rest of the 178 patients (74.16%). The most mutual radiological outcome was wall edema of the gall bladder, seen in 113 out of 240 patients (47.08%). This was followed by ascites, that were observed in 38.33% (n=92) cases. Hepatomegaly was noted in 10.83% (n=26), splenomegaly in 3.75% (n=9) respectively. This finding aligns with a study, where gall bladder wall condensing was testified in 94% of patients with severe dengue fever and in 33% of mild cases of dengue.[9]

In our research, the next frequently observed complication was ascites, with a prevalence of 38.33%. Numerous prior studies have consistently identified ascites as the most prevalent manifestation of dengue fever. Ascites emerges as the most common observation in individuals with dengue, potentially signifying the initial stage of capillary leakage. This juncture in the disease's progression is crucial for effective management, and ultrasonography can play a pivotal role in detecting this early phase of the disease. Researchers conducted a study, determining that ascites was present in only 26% of mild dengue cases but in 94% of severe cases.[10]

In our study, hepatomegaly was observed in up to 10.83%, which is relatively uncommon compared to previous reports. researchers found hepatomegaly in up to 49% of cases, and another study in Pakistan reported hepatomegaly in 35.5% of cases, a figure comparable to our findings. Another noteworthy liver-related finding was the presence of prominent portal triads or periportal echoes. Hepatocytes experience vacuolar nuclear degeneration and mitochondrial inflammation as a result of apoptosis. The literature generally reports prominent periportal echoes in cases of hepatic viral infections; however, there is little information available on their correlation with dengue fever..[11-15]

In our investigation, the least common complications included IH (intracranial hemorrhage) and BRSH

(bilateral rectus sheath hematoma), as illustrated in figure 5a and b. The occurrence of hemorrhages in dengue fever results from a combination of several factors, such as low platelet count, dysfunctional platelets, increased fibrinolysis, and heightened vascular fragility. Intracranial hemorrhage linked to dengue fever is an uncommon complication attributed to various factors, including coagulopathies, vasculopathies, and thrombocytopenia. We observed one case (1.66%) of dengue-associated intracranial hemorrhage, consistent with previously reported data. Additionally, 4 out of 240 patients experienced bilateral rectus sheath hematomas, which is also among the rarest complications associated with dengue fever.

Conclusion

Dengue fever presents with a variety of manifestations. Imaging techniques, especially ultrasound, can be employed to promptly identify the characteristics and complications of dengue fever in emergency situations, even when serological tests are unavailable or delayed.

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 https://doi.org/10.1038/s41564-019-0476-8
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. Pedrosa MS, de Paiva MH, Oliveira LG, Pereira SM, da Silva CH, Pompeu JG. Oral manifestations related to dengue fever: a systematic review of the literature. Australian dental journal. 2017 Dec;62(4):404-11. https://doi.org/10.1111/adj.12516
5. Kathiriya JB, Shah NM, Patel JS, Javia BB, Tajpara MM, Ghodasara SN, Barad DB. Epidemiological surveillance of Dengue fever: An overview. Int J Vet Sci Amin Hasb. 2020;5(6):1-0.
6. Jayarajah U, Madarasinghe M, Hapugoda D, Dissanayake U, Perera L, Kannangara V, Udayangani C, Peiris R, Yasawardene P, De Zoysa I, Seneviratne SL. Clinical and biochemical characteristics of dengue infections in children from Sri Lanka. Global Pediatric Health. 2020 Nov;7:2333794X20974207. https://doi.org/10.1177/2333794X20974207
7. Sehrawat P, Biswas A, Kumar P, Singla P, Wig N, Dar L, Sood R. Role of cytokines as molecular marker of dengue severity. Mediterranean journal of hematology and infectious diseases. 2018;10(1). https://doi.org/10.4084/mjhid.2018.023
8. Begum F, Das S, Mukherjee D, Mal S, Ray U. Insight into the tropism of dengue virus in humans. Viruses. 2019 Dec 9;11(12):1136. https://doi.org/10.3390/v11121136
9. Islam MT, Quispe C, Herrera-Bravo J, Sarkar C, Sharma R, Garg N, Fredes LI, Martorell M, Alshehri MM, Sharifi-Rad J, Daştan SD. Production, transmission, pathogenesis, and control of dengue virus: A literature-based undivided perspective. BioMed Research International. 2021 Dec 15;2021. https://doi.org/10.1155/2021/4224816
10. Jahan F. Dengue fever (DF) in Pakistan. Asia pacific family medicine. 2011 Dec;10:1-4. https://doi.org/10.1186/1447-056X-10-1
11. Khan J, Khan I, Ghaffar A, Khalid B. Epidemiological trends and risk factors associated with dengue disease in Pakistan (1980-2014): a systematic literature search and analysis. BMC public health. 2018 Dec;18:1-3. https://doi.org/10.1186/s12889-018-5676-2
12. Kulkarni MA, Duguay C, Ost K. Charting the evidence for climate change impacts on the global spread of malaria and dengue and adaptive responses: a scoping review of reviews. Globalization and health. 2022 Dec;18(1):1-8. https://doi.org/10.1186/s12992-021-00793-2
13. Yousaf A, Khan FM, Hasan MM, Ullah I, Bardhan M. Dengue, measles, and COVID-19: a threefold challenge to public health security in Pakistan. Ethics, Medicine, and Public Health. 2021 Dec;19:100704. https://doi.org/10.1016/j.jemep.2021.100704
14. Yousaf A, Khan FM, Hasan MM, Ullah I, Bardhan M. Dengue, measles, and COVID-19: a threefold challenge to public health security in Pakistan. Ethics, Medicine, and Public Health. 2021 Dec;19:100704. https://doi.org/10.1016/j.jemep.2021.100704
15. Khatri G, Hasan MM, Shaikh S, Mir SL, Sahito AM, Priya, Rocha IC, Elmahi OK. The simultaneous crises of dengue and COVID-19 in Pakistan: a double hazard for the country's debilitated healthcare system. Tropical Medicine and Health. 2022 Feb 25;50(1):18. https://doi.org/10.1186/s41182-022-00410-x