

**Original research article**

**CLINICAL ASSOCIATION OF HEPATIC IMPAIRMENT WITH DENGUE INFECTION OUTCOMES IN CHILDREN AT TERTIARY CARE CENTER**

**<sup>1</sup>Dr. Pendurthi Venkata Krishna, <sup>2</sup>Dr. Y.Shasidhar Reddy, <sup>3</sup>Dr. Varuna Sree,  
<sup>4</sup>Dr. Vaishnavi Rani, <sup>5</sup>Dr. Mahesh S D,**

<sup>1</sup>Professor & HOD, Department of Paediatrics, Viswabharathi Medical College & General Hospital, R TNagar Near Penchikalapadu, Kurnool, Andhra Pradesh, India

<sup>2,3,4</sup>Assistant Professor, Department of Paediatrics, Viswabharathi Medical College & General Hospital, R TNagar Near Penchikalapadu, Kurnool, Andhra Pradesh, India

<sup>5</sup>Post-Graduate Student, Department of Paediatrics, Viswabharathi Medical College & General Hospital, RT Nagar Near Penchikalapadu, Kurnool, Andhra Pradesh, India

**Corresponding Author:**

Dr. Pendurthi Venkata Krishna

**Abstract**

**Background:** Dengue virus infection has become a major public health concern in recent years due to an increase in its complex and unusual symptoms. Hepatomegaly increased liver enzymes to fulminant hepatic failure are just a few of the diverse signs of dengue's hepatic involvement.

**Material and Methods:** At the Department of Paediatrics, Viswabharathi Medical College & General Hospital, R T Nagar Near Penchikalapadu, Kurnool, Andhra Pradesh, India, this was the prospective Cohort Study that was planned. The study used 50 people who were treated with a Dengue infection and had a positive test for Dengue. Patients with a Dengue Sero positive are chosen and checked for hepatomegaly and jaundice. They also get a full blood count, Liver function tests, and an ultrasound of the abdomen, PT, APTT, HBsAg, HCV and Widal. Study was done between February 2022 to January 2023.

**Results:** Early detection of dengue's hepatic dysfunction could help determine how serious the condition is. Massive hemorrhage and other life-threatening consequences could be avoided with early management. Future research should test the role of hepatoprotective medications in dengue to promote early recovery and lower morbidity and mortality.

**Conclusion:** There have been various reports of dengue outbreaks increasing hepatic involvement in emerging nations like India. Early detection of hepatic dysfunction should help to prevent life-threatening consequences because it is temporary and reversible in dengue.

**Keywords:** Clinical association, hepatic impairment, dengue infection, children

**INTRODUCTION**

Infection with dengue is a significant public health hazard in the majority of tropical locations across the world, with the Indian subcontinent and other countries in south East Asia having the highest risk of contracting the disease <sup>[1]</sup>. Dengue fever is the arbovirus disease that affects the most people around the world. There are at least four distinct antigenic kinds of the dengue

virus, which is a member of the family Flaviviridae. These types include DEN 1, DEN 2, DEN 3, and DEN 4. Over the course of the last several decades, the prevalence of dengue fever around the world has considerably increased <sup>[2]</sup>. There are a number of reasons that can play a role in the progression of dengue fever, including unregulated population expansion, unchecked urbanization, crowding, inadequate healthcare, increasing travel to epidemic areas, ineffective vector management, climatic change, and a lack of public education <sup>[3-5]</sup>.

It is well known that dengue infections can present themselves clinically in a variety of different ways, ranging from asymptomatic illness to the most severe of outcomes. There has been a recent rise in the incidence of peculiar symptoms <sup>[6]</sup>. Acute respiratory distress syndrome, encephalitis, Guillain-Barre syndrome, dengue hepatitis, and myocarditis are some of the diseases that fall under this category. Hepatic dysfunction can vary from modest injury with elevated transaminase activity and hepatomegaly to severe damage with jaundice and fulminant hepatic failure. The degree of hepatic dysfunction might vary greatly depending on how the condition manifests itself clinically <sup>[7, 8]</sup>.

Infections with the dengue virus are known to manifest clinically in a variety of different ways, ranging from no symptoms at all to quite serious consequences. There has been an increase in the occurrence of strange symptoms. Myocarditis, encephalitis, acute respiratory distress syndrome, Guillain-Barre syndrome, and dengue hepatitis are some of the diseases that fall under this category <sup>[9]</sup>. There are many different types of hepatic dysfunction, ranging from mild injury with high transaminase activity, hepatomegaly, and fulminant hepatic failure to severe injury with jaundice. All of these symptoms indicate damage to the liver. The severity of hepatic dysfunction might vary from patient to patient based on how the disease manifests clinically <sup>[10]</sup>. Hepatic dysfunction can be caused by a wide variety of conditions, including inadequate perfusion, metabolic acidosis, and disseminated intravascular coagulation, amongst others. Ischemia is the end result, and it causes significant damage to the liver. The clinical manifestations of dengue have, on the other hand, only been the focus of a small number of studies. The purpose of the current analysis was to investigate clinical correlations, particularly those that existed between clinical characteristics, laboratory data, morbidity and mortality <sup>[11, 12]</sup>.

Hepatic dysfunction may have multiple causes, including but not limited to insufficient perfusion, metabolic acidosis and disseminated intravascular coagulation (DIC). Ischemia follows as a direct consequence of this and it brings about considerable damage to the liver. In areas where dengue fever and dengue hepatitis are common, the presence of fever, jaundice, and hepatomegaly should raise suspicions of dengue hepatitis. If you are able to recognize these symptoms of dengue's involvement in the liver, you may be better able to make an early diagnosis and prevent morbidity and fatality. On the other hand, there haven't been a lot of studies done on the effects of dengue fever on the liver. Keeping that in mind, the research project in question has been carried out <sup>[13]</sup>. One of the aims and goals of the study was to investigate the hepatic impairment that can occur in children who have a dengue infection. To investigate clinical correlations, which may include clinical characteristics, test results, morbidity, and mortality.

## **MATERIALS AND METHODS**

The prospective cohort study that was announced at the Department of Paediatrics, Viswabharathi Medical College & General Hospital, R T Nagar Near Panchikalapadu, Kurnool, Andhra Pradesh, India, was this one. For the study, 50 patients who had been hospitalized with dengue infection and tested seropositive for dengue were employed. Patients with dengue seropositivity are chosen, checked for hepatomegaly and jaundice, and given a full blood

count, liver function tests, and an abdominal ultrasound, PT, APTT, HBsAg, HCV, and Widal, all of which are then analyzed. The study was place between February 2022 to January 2023.

### Inclusion Criteria

- All instances with positive serology.

### Exclusion Criteria

- Associated illnesses known to affect the liver, such as leptospirosis, enteric fever, hepatitis and malaria.

Patients who test positive for Dengue virus antibodies are selected, then clinically evaluated for hepatomegaly and jaundice, and they also have a complete blood count, liver function tests, ultrasonography of the abdomen, PT, APTT, Widal, HBsAg, and HCV testing and analysis.

## RESULTS

The paediatrics department was where the study was carried out. 50 cases between the ages of 2 months and 12 years who tested positive for the serological IgM dengue antibody were included in this study and met the WHO criteria for the diagnosis of dengue infection.

**Table 1: Diagnosis and patient information**

Sr. No.	Diagnosis	Frequency
1.	Probable dengue (pd)	40
2.	Dengue with warning signs (d+ws)	07
3.	Severe dengue (sd)	03
	Total	50

Forty of the fifty patients who were admitted to the hospital with a dengue infection were diagnosed as having a dengue infection that was Probable, seven had Warning Signs, and three were suffering from Severe Dengue.

**Table 2: Distribution of cases according on gender**

Diagnosis	Gender of the child		Total
	Male	Female	
	N	N	
PD	25	17	42
D+WS	27	20	47
SD	5	6	11
Total	57	43	100

Dengue fever afflicted both male and female youngsters to a nearly equal degree.

**Table 3: Comparing groups based on the presence of hepatomegaly**

Liver span	Diagnosis	
	PD	D+WS
Normal	40	-2
Increased	-	42
Total	40	44

Of the patients, 55% had hepatomegaly. When compared between the group, 100% of patients had severedengue and 90% of patients had warning signals. 50 serologically confirmed dengue cases were hospitalized, of whom 7 were deemed to have Probable Dengue, 40 to have Warning Signs, and 3 to have Severe Dengue. Due to DIC, two severe dengue cases passed away. In these instances, the enzyme levels were exceedingly high.

### DISCUSSION

The purpose of this study was to determine the clinical correlates of hepatic dysfunction in children with dengue infection, including clinical characteristics, test results, morbidity, and mortality. According to WHO recommendations, the 50 serologically confirmed dengue cases who were hospitalized weredivided into three categories: probable dengue, severe dengue, and dengue with warning signs.

The following things were noticed: Fever was present in each patient. Most frequently happened in the age range of 5 to 7 years. The most common clinical symptom was hepatomegaly. In 88% of instances, thrombocytopenia was observed. 10% of participants with severe dengue infection had elevated serum total bilirubin <sup>[11-13]</sup>.

Seventy-four percent of dengue patients had elevated serum SGOT. When the groups were compared, those with probable dengue, those with warning signs, and those with severe dengue (100%) all experienced an increase in SGOT. In 58% of patients with dengue infection, the SGPT level was elevated. When the groups were compared, individuals with probable dengue, warning signs, and severe dengue all experienced an increase in SGPT <sup>[14]</sup>.

In 28% of patients with dengue infection, the SGPT level was elevated. When the groups were compared, patients with 9.5% of probable dengue, 32% with warning signs, and 82% with severe dengueexperienced an increase in SGOT. 11% of dengue infection patients had elevated prothrombin times. When the groups were compared, 6.4% of those with warning signs and 72% of those with severe dengue experienced an increase in PT <sup>[15, 16]</sup>.

Hepatomegaly was more likely to develop in patients with severe dengue and in those who had warning signs. Hepatomegaly affected 55% of those in the current study who had probable dengue, % had warning signs and % had severe dengue. Therefore, hepatomegaly can be used to gauge how serious the illness is. Hepatomegaly was found in 47.2% of patients in an Indonesian study <sup>[17]</sup>. SGPT levels rise and are predominantly associated with hepatocytes when the liver is injured. Hepatocytes, kidney, brain, heart, skeletal muscle and other tissues all contain SGPT, which is increased when these tissues are injured. Liver enzymes can be used to determine the early febrile stage of dengue. Patients with dengue showed increased serum SGOT in 74% of cases. When the groups were compared, there was an increase in SGOT in all three categories: probable dengue, warning symptoms, and severe dengue. Studies by Brij

Mohan *et al.* and Srivenutha *et al.* also discovered abnormal liver enzyme levels [18-20].

Patients with jaundice are more prone to develop severe dengue and have a poor prognosis. Other research discovered a high frequency of severe dengue due to a lack of public awareness and a lack of prompt medical attention [21]. In a study conducted in Nagpur, jaundice appeared in 24 percent of the 50 severe dengue cases. Hypoalbuminemia may result from liver injury or capillary leakage. 12% of patients in the recent study had hypoalbuminemia. In the Manzi Wong *et al.* study, 16.5% of the individuals developed hypoalbuminemia. Prothrombin time is influenced by clotting factors that depend on vitamin

K. Extreme dengue is thought to cause aberrant PT. In the most recent study, increased prothrombin times were seen in 11% of those who had dengue fever. When the groups were compared, an increase in PT was seen in 6.4% of people with warning indications and 72% of people with severe dengue [22-24]. According to a study conducted in Nagpur, dengue fever includes cases of severe dengue and cases of dengue fever with a warning among patients with high prothrombin times. Another study conducted in Chennai found that infants made up the majority of those under the age of five who experienced severe dengue [24]. In our study, 19.2% of the 120 patients had hypoproteinemia. Ages 0 to 4 are most frequently impacted. In our study, dengue fever was 6.5%, dengue with warning signs was 26%, and hypoproteinemia in severe dengue was 100%, indicating that liver function is more aberrant in severe dengue. 35% of the participants in our study showed hypoalbuminemia. The 12 to 16 year old age range is the most frequently impacted. In our study, patients with dengue fever had a hypoalbuminemia rate of 26.1%, patients with warning signs had a rate of 39.7%, and patients with severe dengue had a rate of 100%, indicating that liver function is more aberrant in severe dengue [25].

Completely Activated Thromboplastin 11% of dengue patients had their clocks adjusted. When the groups were compared, patients with warning signals had an increase in APTT at a rate of 6.4%, and those with severe dengue had a rate of 72%. In 12% of patients with dengue infection, serum total protein was decreased. When the groups were compared, 12.7% of those with warning signs and 54.5% of those with severe dengue experienced a decline in blood protein. In 3% of dengue infection patients, serum albumin was lower. In our study, two severe dengue cases passed away. In these instances, the enzyme levels were exceedingly high [26-29].

## CONCLUSION

Dengue outbreaks are more frequent in developing nations like India. There have been reports of various levels of hepatic involvement. Early detection of the same would help to avoid life-threatening complications as hepatic impairment in dengue is temporary and reversible. This may aid in lowering dengue infection-related morbidity and mortality. More research is needed to examine how hepato protective medications affect morbidity and death.

**FUNDING:** None.

**CONFLICT OF INTEREST:** None.

## REFERENCES

1. Ravi JR, Suraboina Satishkumar G. Liver Function Tests to Predict the Severity of Dengue Fever in Serologically Positive Children Below 18 Years of Age. *European Journal of Molecular & Clinical Medicine*. 2022 Jun;9(3):10404-13.

2. HN YR, Kumar R, Rudrappa S. Liver function tests to predict the severity of dengue fever in serologically positive children below 18 years of age.
3. Khan ZI. Analysis of Dengue Infection with Hepatic Dysfunction in the Pediatric Patients: Prospective Analysis.
4. Kumari BA. Association between the degree of hepatic dysfunction and complications among serologically positive and serologically negative dengue infection in children.
5. Alam HS, Fardush T, Banik AK, Ahsan MR, Al Mamun AM. Clinical and Laboratory Profile in Children with Dengue Viral Infection: A Single Centre Experience. *Saudi J Pathol Microbiol.* 2022;7(12):473-9.
6. Manohar B, Latha NM, Kumar BS, Madhavi K, Sivaramadu K, Dudala SR. Clinical profile and liverfunction in Dengue. *NIJP.* 2015 Jan;4:15-21.
7. Rahman MA, Rao KR, Sravya V. Prediction of severity of dengue infection in children based on hepatic involvement.
8. Alam MA, Shankar MD. Liver Profile in Patients with Dengue Viral Infection and its Clinical Correlation.
9. Roy A, Sarkar D, Chakraborty S, Chaudhuri J, Ghosh P, Chakraborty S. Profile of hepatic involvement by dengue virus in dengue infected children. *North American journal of medical sciences.* 2013 Aug;5(8):480.
10. Bandaru AK. Association between the degree of hepatic dysfunction and complications among serologically positive and serologically negative dengue infection in children. *American Journal of Physiology, Biochemistry and Pharmacology.* 2015;4(1):6-12.
11. Yasmin A, Akhter R, Shapla SP, Yeasmin L. Severity of Liver Involvement in Children with Dengue Infection. *Bangladesh Journal of Infectious Diseases.* 2020;7(2):90-4.
12. Dhingra H, Kathuria B, Deshmukh CT. Clinical, Epidemiological, Biochemical Profile and Outcomes of Dengue and Dengue-like Illness in Children. *Pediatric Infectious Disease.* 2020 Jan;2(1):2.
13. Selvan T, Saravanan P, Nagaraj MV, Tudu MN. Study of hepatic dysfunction of dengue fever in children. *International Journal of Contemporary Pediatrics.* 2017 May;4(3):901.
14. Yadav SK, Sethi AS, Yadav DK, Kumar A, Yadav RS, Chaurasiya OS, *et al.* Clinical Profile and Hepatic Dysfunction Pattern in Paediatric Dengue Infection: A Prospective Study from BundelkhandRegion of Central India. *People.* 2021 Jan;14(1):01.
15. Murmu SK, Mishra NR, Nayak BK. Dengue hepatic severity score: A glimmer to the clinician. *Indian Journal of Child Health.* 2018 Feb;5(2):80-5.
16. Manohar B, Latha NM, Kumar BS, Madhavi K, Sivaramadu K, Dudala SR. Clinical profile and liverfunction in Dengue *Research Article.*
17. Prasad D, Bhriguvanshi A. Clinical profile, liver dysfunction and outcome of dengue infection in children: a prospective observational study. *The Pediatric Infectious Disease Journal.* 2020 Feb;39(2):97-101.
18. Bandaru AK, Vanumu CS. Early predictors to differentiate primary from secondary dengue infection in children. *Medical Journal of Dr. DY Patil University.* 2016 Sep;9(5):587.

19. Singh S, Meena JK, Verma CR, Bhaskar V. A hospital-based study of hepatic dysfunction in children with dengue fever. *Asian Pacific Journal of Tropical Disease*. 2015 Dec;5(12):964-7.
20. Jayarajah U, Madarasinghe M, Hapugoda D, Dissanayake U, Perera L, Kannangara V, *et al*. Clinical and biochemical characteristics of dengue infections in children from Sri Lanka. *Global Pediatric Health*. 2020 Nov;7:2333794X-20974207.
21. Madhusudan SR, Prabhavathi R, Suman MG, Govindaraj M, Puttaswamy M. Prevalence of hepatobiliary dysfunction and ultrasonographic abnormalities in dengue fever in pediatric age group.
22. Bhriguvanshi A, Prasad D. Prognostic role of liver function tests in pediatric dengue illness. *International Journal of Infectious Diseases*. 2020 Dec;101:507-8.
23. Wiwanitkit V. Liver dysfunction in dengue infection, an analysis of the previously published Thai cases. *Journal of Ayub Medical College Abbottabad*. 2007 Mar;19(1):10-2.
24. Mohan N, Goyal D, Karkra S, Perumal V. Profile of dengue hepatitis in children from India and its correlation with WHO dengue case classification.
25. Nawaz R, Ullah R, Ghaffar T, Naz S. Frequency of Hepatitis and Abnormal Liver Function Tests in Dengue Fever. *KJMS*. 2017 Sep;10(3):289.
26. Ahmad WA, Jamil SH, Hussain RI, Umar NA, Sheikh F. A clinical study to see the correlation between the degree of impaired liver function tests (LFT'S) and the complications in dengue fever. *Pak J Med Health Sci*. 2012;2(6):472-75.
27. Bandyopadhyay D, Chattaraj S, Hajra A, Mukhopadhyay S, Ganesan V. A study on spectrum of hepatobiliary dysfunctions and pattern of liver involvement in dengue infection. *Journal of clinical and diagnostic research: JCDR*. 2016 May;10(5):OC-21.
28. Majumdar I, Mukherjee D, Kundu R, Niyogi P, Das J. Factors Affecting Outcome in Children with Dengue in Kolkata. *Indian Pediatrics*, 2017 Sep, 54(9).
29. Kichu G. Hepatic Dysfunction in Children with Dengue Viral Infection in PSG Hospitals (Doctoral dissertation, PSG Institute of Medical Sciences and Research, Coimbatore).