

## Study on Clinical Profile of Liver Function Test in Patients with Dengue Infection

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### Abstract:

**Background:** There have been numerous reports of unusual dengue infection presentations involving the liver, ranging from slight increases in aminotransferase levels to fulminant hepatitis.

**Methods:** At the medicine department of the DMCH, Laheriasarai, Bihar, 27 cases of dengue infection that had been serologically confirmed were examined. Patients with normal levels of aminotransferase were assigned a grade of A, those with at least one enzyme elevated to less than three times the reference range were assigned a grade of B, those with at least one enzyme elevated to more than three times the reference range were assigned a grade of C, and those with elevations greater than ten times were assigned a grade of D.

**Results:** 89% of the cases showed altered aminotransferase levels, with 22% being Grade D or acute hepatitis, 37% being Grade B, and 30% being Grade C ( $P < 0.001$ ). In comparison to alanine aminotransferase (ALT), aspartate aminotransferase (AST) levels were greater (mean: 296.9 U/l and 390.7 U/l, respectively).

**Conclusion:** A typical side effect of dengue infection is liver damage with altered aminotransferases, which is a useful marker for keeping track of these patients.

**Keywords:** Aminotransferase, dengue fever, hepatic injury

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### Introduction

In many tropical and subtropical areas of the world, dengue is the most prevalent arboviral infection that is spread by mosquitoes and is endemic. Dengue fever prevalence has tripled during the past 50 years due to geographic growth into new nations and, in the last ten years, a shift from urban to rural settings. Around 2.5 billion people reside in dengue endemic areas, and an estimated 50–100 million dengue infections are reported each year. Case mortality rates range from 1% to 5%, but they can be < 1% with the right care.[1]

Clinically, it presents as dengue shock syndrome and dengue hemorrhagic fever in its most severe form. Over the past few years, unusual clinical dengue fever presentations have increased in frequency. Despite the fact that the liver is not a primary target organ, hepatic dysfunction is a well-known symptom, frequently accompanied by acute hepatitis, right hypochondrium discomfort, hepatomegaly, jaundice, and elevated aminotransferase levels.[2-10]

Direct viral effects on liver cells or a poorly controlled host immune response to the virus can both cause liver impairment as a result of dengue infection.[4-10]

Being a tertiary care facility, our hospital sees a lot of dengue infection patients, including those with unusual symptoms. The amount of hepatic impairment and its prognostic value in individuals with dengue virus infection have thus been attempted to be evaluated.

### Materials and Methods

The present study was conducted at Department of Medicine, Darbhanga Medical College and Hospital, Laheriasarai, Bihar from March 2022 to August 2022. In recent years, dengue disease has become more common in this region. It is well recognized that dengue fever affects several systems, occasionally leading to multi-organ dysfunction. It is known that dengue fever can cause liver involvement, and recently there have been numerous reports of fulminant hepatitis with dengue fever. To

determine the profile of liver involvement in individuals with dengue viral infection, the following prospective observational study of 53 consecutive patients with dengue fever was carried out. When two or more of the following symptoms: fever, retroorbital discomfort, myalgia, arthralgia, skin rash, nausea/vomiting, and hemorrhagic manifestations appear, dengue was considered to be the cause. Both liver function tests and complete blood counts were performed. All patients underwent tests to look for anti-dengue antibodies and/or NS1 antigen. These samples were tested using a Panbio dengue IgM-Capture ELISA, an immunoenzymatic assay. Patients were thought to be infected with dengue virus if the findings of either of these tests were positive, while cases in which the results were negative were thought to be unconfirmed.

Based on the levels of the enzymes aspartate aminotransferase (AST) and alanine aminotransferase

(ALT), the extent of liver involvement was divided into four groups. AST and ALT have reference values of 40 U/l. Grade A was given to patients whose aminotransferase levels were normal. Grade B was given to those whose levels of at least one aminotransferase were increased but less than three times the reference limit. Patients were given a grade of C or Grade D, indicating the presence of hepatitis, if at least one aminotransferase was found to be greater than three times the reference range but less than ten times the reference value in the patient's blood. These patients had the necessary testing to rule out other hepatitis causes, primarily hepatitis A, B, and C.

### Results

Twenty-seven of the 53 patients (51%) who had a serological test obtained a positive result, with 17 (63%) male and 10 (37%) female. Table 1 contains a summary of the data.

**Table 1: Biochemical profile of patients in the study**

Parameters	Subjects with positive serological results (n=27) Mean±SD	Subjects with negative serological results (n=26) Mean±SD	p-value
Age (in years)	34.30±15.0	37.38±14.5	0.348
Platelets (cell/mm <sup>3</sup> )	81.926±63.315	150.817±73.290	<0.0001
Total bilirubin (mg/dl)	12±1.4	0.786±0.46	0.21
Direct bilirubin (mg/dl)	0.65±1.07	0.27±0.46	0.25
Total protein (g/dl)	6.69±0.48	7.25±0.59	0.001
Albumin (g/dl)	3.85±0.38	4.25±0.45	0.0321
Globulin (g/dl)	2.83±0.37	3.0±0.28	0.039
AST (U/l)	390.69±730.68	47.22±6.08	0.03
ALT (U/l)	296.9±562.0	42.15±23.69	0.029
ALP (U/l)	98.78±51.01	107.82±71.11	0.76

There were no cases of fulminant hepatitis or encephalopathy. Although one patient showed coagulopathy (an increased prothrombin time), no clinically significant bleeding manifestation was present. The sickness did not cause any deaths.

In confirmed cases, the albumin level was considerably lower ( $P = 0.03$ ). At least one liver enzyme was elevated in 23 (85%) of the patients ( $P < 0.001$ ), with AST changes occurring in 23 (85%) and ALT changes occurring in 21 (77.8%) of the

patients. Elevations of AST were significantly higher than ALT (390.7 U/l vs. 296.9 U/l). In 3 (11%) of the 27 confirmed cases, both enzymes were normal (Grade A), 10 (37%) of the cases had changed enzyme levels (Grade B), 8 (30%) of the cases had at least one enzyme increase to three times its reference value (Grade C), and 6 (22%) of the cases had acute hepatitis (Grade D) [Table 2]. The mean AST was higher in males, while the mean ALT was higher in females.

**Table 2: Classification of study subjects to aminotransferase levels**

Classification	Mean	Grade A n(%)	Grade B n(%)	Grade C n(%)	Grade D n(%)	Total (n=53)
<b>Sex</b>						
• Male		12(34.3%)	13(37.1%)	6(17.1%)	4(11.5%)	35
• Female		5(27.8%)	7(38.9%)	4(22.2%)	2(11.1%)	18
p-value =0.9920						
<b>Serology</b>						
Positive		3(11%)	10(37%)	8(30%)	6(22%)	27(51)
• AST (U/l)	390.7±730.6	4(15%)	10(36.5%)	8(30%)	5(18.5%)	
• ALT (U/l)	296.9±562.08	6(22%)	12(44.5%)	5(18%)	4(15%)	
p-value =0.709						
Negative		14(54%)	10(38%)	2(8%)	0(0%)	26(49)
p-value <0.001						

Although there was no statistically significant correlation between the degree of thrombocytopenia and changes in aminotransferases, 17 (63%) of the participants had high liver enzymes and had a platelet count below 100,000 cells/mm<sup>3</sup>. Total bilirubin levels were increased above the reference range in four individuals, who had liver enzymes above 1000 U/l.

### Discussion

According to our data, practically all dengue infection patients had liver damage, which is consistent with earlier results from other poor nations.[4] Although one-fifth of the patients had acute hepatitis without serious consequences, the majority of these patients had mild to moderate liver impairment.

The majority of the patients in the current study exhibited increased AST values. Elevation of AST typically occurred either together with ALT elevation or as a sole modification in patients with grade B, C, or D hepatic involvement. 15% of the patients had normal AST levels compared to 22% of the patients with normal ALT levels. Other research have seen a similar tendency.[3,5] This typical pattern, which differs from those seen during acute hepatitis brought on by hepatitis viruses<sup>6</sup>, in which the AST increases more quickly and peaks at a higher level, has been observed in dengue infection.<sup>7,8</sup> Skeletal muscle injury may account for the elevated AST values given the prevalence of musculoskeletal symptoms in dengue.

According to the levels of aminotransferases, Fadilah S et al. categorized 42.5% of patients as Grade B, 17.5% as Grade C, and just 1.8% as Grade D.[9] On the other hand, Grade D liver damage was present in 22% of our patients. In 18.5% and 15%, respectively, of the confirmed cases, the AST and ALT levels were increased by more than 10 times the standard value.

According to Trung DT et al., increases in albumin, alkaline phosphatase (ALP), bilirubin, and prothrombin were unrelated to the severity of the disease in most critically ill patients, although they did find that these individuals had greater levels of aminotransferases and lower levels of globulin.[10] Similar to the previous study, verified cases had significantly lower globulin levels. Due to a decrease in the gradient of intra- and extravascular pressure, the fall in serum globulin is a significant contributor to fluid loss in the third space, which is suggestive of the severity of dengue.

As a result, AST, ALT, and globulin are useful indicators of the infection's severity.[6,9]

The study does have certain restrictions, though. The precise correlation between the aminotransferases and the various dengue fever grades could not be determined due to the small sample size. To conclusively determine whether aminotransferases

may be utilized as a prognostic indicator, a larger investigation is needed. Second, it was not possible to do a second convalescent sera test to confirm dengue infection due to cost limitations.

### Conclusion

In conclusion, practically all of the 27 patients with serologically confirmed dengue infection had liver involvement, as seen by elevated transaminases levels.

Due to the small sample size, it was impossible to determine whether there was an association with the disease's severity. A sizable portion of the individuals developed jaundice and severe hepatitis. The effect was typically modest in patients, and full recovery was frequently achieved with supportive care. It's important to avoid diagnosing viral hepatitis inadvertently.

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