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Original Article

STUDY OF HEPATIC DYSFUNCTION IN DENGUE PATIENT

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ABSTRACT

Objective: To evaluate the prevalence, severity, and clinical outcomes of hepatic dysfunction in dengue patients admitted to the Department of General Medicine at MGM Medical College and LSK Hospital, Kishanganj, Bihar.

Methods: A cross-sectional analysis was conducted on dengue-confirmed patients. Liver function parameters, including serum AST, ALT, bilirubin, and alkaline phosphatase levels, were assessed. Demographic and clinical data were analyzed to identify correlations between hepatic dysfunction and disease severity.

Results: Elevated AST and ALT levels were observed in 83.3% and 80% of patients, respectively, with severe elevations in 16.7% (AST) and 13.3% (ALT). Mild hyperbilirubinemia occurred in 26.7% and ALP elevation in 33.3% of cases. Jaundice was uncommon (6.7%), predominantly affecting younger adults (18–30 years), with males more frequently involved. Liver enzyme elevations correlated positively with disease severity, peaking in dengue shock syndrome (DSS) cases.

Conclusion: Hepatic dysfunction is a frequent and clinically significant complication of dengue fever. Liver enzyme elevations may serve as valuable markers of disease severity. Early recognition and monitoring of hepatic involvement are essential for improving patient outcomes. Further multicenter studies are needed to validate these findings and elucidate underlying mechanisms.

Keywords: Hepatic dysfunction, Dengue, Liver function, Liver involvement, Clinical study

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INTRODUCTION

Dengue fever, caused by the dengue virus (DENV), is a mosquito-borne viral disease that poses a significant global public health challenge. It is endemic in more than 100 countries, affecting millions annually. Despite its prevalence, the pathophysiological mechanisms, especially those concerning extrapulmonary manifestations like hepatic dysfunction, are not fully understood. Hepatic dysfunction is increasingly recognized as a complication of dengue, manifesting as elevated liver enzymes and, in severe cases, acute liver failure [1].

The liver plays a crucial role in metabolism, detoxification, and immune response, processes that are disrupted by viral infections such as dengue. Studies suggest that hepatic involvement in dengue can vary from mild hepatomegaly and elevated transaminases to severe hepatitis [2]. The pathogenesis of liver injury in dengue is hypothesized to be multifactorial, involving direct viral invasion, immune-mediated damage, and ischemia from microvascular dysfunction [3].

Understanding the spectrum of hepatic dysfunction in dengue is vital for early diagnosis and management, which can significantly influence patient outcomes. This study aims to elucidate the prevalence, severity, and clinical outcomes of hepatic dysfunction in patients with dengue, providing insights that could lead to better patient management strategies.

MATERIALS AND METHODS

Study design and setting

It was a hospital-based observational study conducted at the Department of General Medicine, MGM Medical College and LSK Hospital, Kishanganj, Bihar. The study period spans from January 2024 to December 2024.

Participants

The study population consisted of patients diagnosed with dengue fever, confirmed through NS1 antigen and IgM antibody tests. Patients were admitted to the hospital during the study period who meets the following criteria was included:

- Confirmed diagnosis of dengue fever.
- Age 18 y or older.
- Consent to participate in the study.

Exclusion criteria include

- Patients with pre-existing liver diseases (e. g., hepatitis B, hepatitis C, alcoholic liver disease).
- Patients with dengue shock syndrome or severe dengue leading to multi-organ failure at the time of admission.
- Pregnant women.

Data collection

Data were collected through a structured questionnaire administered by the medical staff. The questionnaire was capture demographic information, clinical symptoms, duration of illness, and any prior medical conditions. Blood samples were drawn within 24 h of admission to measure liver function tests, including AST, ALT, and bilirubin levels. Additional tests, such as coagulation profiles and albumin levels, was also conducted to assess liver function comprehensively.

Statistical analysis

Data was analyzed using SPSS version 26. Descriptive statistics (mean, median, mode, and standard deviation) was used to summarize the demographic and clinical characteristics of the patients. The extent of hepatic dysfunction was evaluated by comparing liver enzyme levels against normal ranges using the t-test for normally distributed data and the Mann-Whitney U test for non-normally distributed data. A p-value of less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Table 1: Age distribution of patients

Age group (years)	Number of patients	Percentage (%)
18-30	12	40%
31-45	9	30%
46-60	6	20%
Over 60	3	10%

The age distribution shows a predominant younger demographic with 40% of the patients aged 18-30 y, followed by 30% in the 31-45 y group, 20% in the 46-60 y group, and the smallest group over 60 y, comprising 10%.

Table 2: Sex distribution of patients

Sex	Number of patients	Percentage (%)
Male	18	60%
Female	12	40%

The gender distribution is skewed towards males, who represent 60% of the cohort compared to 40% females.

Table 3: Type of dengue fever

Type of dengue fever	Number of patients	Percentage (%)
DF	15	50%
DHF	10	33.3%
DSS	5	16.7%

The breakdown of dengue types indicates that 50% of the patients had Dengue Fever (DF), 33.3% had Dengue Hemorrhagic Fever (DHF), and 16.7% suffered from Dengue Shock Syndrome (DSS).

Table 4: Comparison of the pattern of rise of AST in patients with DF, DHF, and DSS

Type of dengue fever	Mean AST level (U/l)	Standard deviation
DF	64.45	±11.45
DHF	69.78	±21.45
DSS	71.23	±19.25

The mean AST levels were slightly higher in patients with more severe forms of the disease (DSS) compared to DF, although the increases were modest across the groups.

Table 5: Comparison of the pattern of rise of ALT in patients with DF, DHF, and DSS

Type of dengue fever	Mean ALT level (U/l)	Standard deviation
DF	49.78	±15.23
DHF	53.21	±25.41
DSS	67.45	±35.32

Table 6: Comparison of the pattern of rise of ALP in patients with DF, DHF, and DSS

Type of dengue fever	Mean ALP level (U/l)	Standard deviation
DF	117.3	±15.23
DHF	130.7	±30.37
DSS	166.1	±51.74

ALT levels also increased with disease severity, showing the highest mean values in DSS patients. Alkaline phosphatase levels followed a similar pattern, with the highest readings in the DSS group.

Table 7: Demographic and liver function test results

Description	Total patients (N=30)	DF (N=15)	DHF (N=10)	DSS (N=5)
Age Group (18-30 y)	12 (40%)	7	3	2
Male	18 (60%)	9	6	3
Female	12 (40%)	6	4	2
Elevated AST levels	25 (83.3%)	13	8	4
Severe elevation in AST levels	5 (16.7%)	1	2	2
Elevated ALT levels	24 (80%)	12	7	5
Severe elevation in ALT levels	4 (13.3%)	1	1	2
Mildly elevated bilirubin levels	8 (26.7%)	4	3	1
Elevated alkaline phosphatase levels	10 (33.3%)	5	3	2
Patients with jaundice	2 (6.7%)	1	1	0

The demographic and liver function results combined showed that a significant proportion of patients had elevated AST (83.3%) and ALT (80%) levels, with severe elevations noted in smaller percentages (16.7% for AST and 13.3% for ALT). Bilirubin levels were mildly elevated in 26.7% of patients, and alkaline phosphatase was elevated in 33.3%. The incidence of jaundice was low, observed in only 6.7% of patients.

DISCUSSION

This study on hepatic dysfunction in dengue patients revealed significant liver enzyme elevations, particularly AST and ALT, which were prevalent in 83.3% and 80% of the patients, respectively. These findings align with those reported by Gupta *et al.*, who also noted elevated liver enzymes in a significant proportion of dengue patients, emphasizing the commonality of hepatic involvement in dengue infections [4]. However, unlike Gupta *et al.*, who reported a higher prevalence of severe enzyme elevations, our study observed moderate elevations even in severe dengue cases.

The age distribution in our study showed a higher susceptibility among the younger demographic (18-30 y), which is consistent with findings from a study by Shah *et al.*, highlighting the vulnerability of the younger population to dengue fever and its complications [5]. Our results also support the notion that while dengue is prevalent among young adults, severe outcomes such as significant liver dysfunction can occur across all age groups.

Sex distribution in our study indicated a higher incidence among males, which corresponds to data reported by Karoli *et al.*, where males were more frequently affected by dengue fever [6]. This could be attributed to greater exposure to mosquito breeding sites or behavioral factors that may increase males' risk of infection.

Comparison of liver function test patterns across different types of dengue fever in our study indicated a gradation in the severity of liver involvement, with DF patients showing the least elevations and DSS patients the most. This pattern was similarly observed in the study by Lee *et al.*, which suggested that liver enzyme levels correlate with the severity of the disease, potentially serving as markers for disease progression [7].

Moreover, the pattern of alkaline phosphatase (ALP) elevation found in our study suggests that ALP could be a more sensitive marker in indicating hepatic dysfunction in DSS, as similarly noted by Malik *et al.* in their study on liver function as a predictor of outcome in dengue hemorrhagic fever [8].

LIMITATIONS

Our study, while comprehensive, was limited by its sample size and the single-center design, which may affect the generalizability of the results. Future studies should aim to include a larger, more diverse population and potentially a multi-center approach to validate these findings across different demographic and geographic profiles. Furthermore, exploring the mechanistic pathways of hepatic injury in dengue could provide deeper insights into targeted therapeutic strategies.

CONCLUSION

Hepatic dysfunction is a notable complication of dengue fever, with enzyme levels correlating with disease severity. Recognizing these patterns can aid clinicians in monitoring disease progression and tailoring management strategies accordingly.

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Nil

AUTHORS CONTRIBUTIONS

All authors have contributed equally

CONFLICT OF INTERESTS

Declared none

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