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Assessment of Hepatic Involvement Through Liver Function Tests in Dengue Patients: A Cross-Sectional Study at a Tertiary Care Hospital in Southern Odisha

Dr. Sangram Kishore Sabat[1], Dr. Braja Sundar Sahoo[2], Dr. Sandhyarani Pati[3], Dr Madhushree Naik[4*].

[1]Assistant Professor, Department of Orthopedics, MKCG Medical College & Hospital, Berhampur, Odisha Mail-Sabatsangram@gmail.com

[2]Professor, Department of Orthopedics,Veer Surendra Sai Institute of Medical Sciences And Research (VIMSAR), Burla, Odisha

[3]Assistant Professor, Department of General Medicine, MKCG Medical College & Hospital, Berhampur, Odisha.

[4]Assistant Professor, Department of Obstetrics and Gynaecology, SCB Medical college & Hospital, Cuttack, Odisha Mail-madhushreeomi84@gmail.com

Corresponding Author: Dr Madhushree Naik,

Mail-madhushreeomi84@gmail.com

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Abstract

Background: Dengue, a vector-borne viral disease, poses a significant public health challenge, especially in South Odisha. This cross-sectional study, conducted at SLN Medical College Hospital, Koraput, Odisha, focuses on evaluating liver function tests in 100 Dengue patients. Acknowledging the importance of hepatic involvement in Dengue, the research aims to provide valuable insights into the manifestations of the disease, potentially enhancing diagnostic and management strategies in the region.

Methodology: Employing a systematic approach, this cross-sectional study enrolled 100 Dengue patients at SLN Medical College Hospital, Koraput, Odisha. Standardized liver function tests, including serum bilirubin, alanine transaminase (ALT), aspartate transaminase (AST), and alkaline phosphatase, were conducted. Data analysis involved descriptive statistics, offering a comprehensive overview of hepatic parameters in Dengue patients within this tertiary care setting.

Results: Among the Dengue patients, 40% exhibited less than a 2-fold increase in AST levels, 28% showed a 2-10-fold rise, and 10% demonstrated more than a 10-fold increase. Overall, 22% maintained normal SGOT values, with 78% displaying elevated levels. Regarding SGPT, 20% had normal values, 35% presented with less than a 2-fold increase, 25% displayed a 2-10-fold rise, and 20% had more than a 10-fold increase from normal levels. Early-stage symptoms like vomiting and abdominal pain correlated with hepatic involvement, with statistically higher AST and ALT levels in patients developing complications such as DHF, DSS, hepatic failure, ARDS, AKI, and encephalopathy.

Conclusion: This study highlights a notable prevalence of hepatic involvement in Dengue patients, underscoring the significance of vigilant monitoring, especially in cases with early symptoms and those at risk of complications. These findings offer crucial insights for tailored interventions and enhanced patient care within the tertiary care context of South Odisha.

Keywords: Dengue, Hepatic Manifestations, Liver Function Tests, AST, ALT, SGOT, SGPT, Tertiary Care Hospital, South Odisha, Cross-Sectional Study.

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Introduction:

Dengue fever, a prevalent mosquito-borne viral infection caused by the dengue virus, poses a substantial global public health challenge (1). South Odisha, India, is experiencing a rising incidence of Dengue cases, necessitating an in-depth exploration of various disease aspects, particularly its impact on the liver.

The clinical spectrum of Dengue ranges from mild febrile illness to severe forms such as Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) (2). Despite this spectrum, there is a noticeable gap in understanding the specific patterns of hepatic involvement and alterations in liver function tests (LFTs) in Dengue patients, especially within the context of South Odisha.

Liver function tests, including serum bilirubin, alanine transaminase (ALT), aspartate transaminase (AST), and alkaline phosphatase, play a crucial role in evaluating hepatic integrity (3). Existing evidence suggests that Dengue infection may lead to hepatic dysfunction, as reflected in elevated LFT values indicative of potential hepatocellular injury (4).

SLN Medical College Hospital, Koraput, Odisha, a tertiary care center, is selected as the study site due to its diverse patient population, ranging from uncomplicated Dengue cases to severe manifestations requiring specialized care (5). The unique healthcare landscape of this setting enhances the study's potential to unravel distinct patterns of hepatic involvement in Dengue patients.

This study aims to conduct a comprehensive analysis of LFTs in 100 Dengue patients at MKCG Medical College Hospital. By elucidating the prevalence and patterns of hepatic involvement, the research seeks to contribute valuable insights into diagnostic precision and therapeutic strategies, with potential implications for Dengue management.

Methodology:

Study Design: This research employs a cross-sectional study design to comprehensively assess LFTs in Dengue patients at a single point in time among a representative sample at MKCG Medical College Hospital.

Study Site: The study is conducted at SLN Medical College Hospital, Koraput, Odisha, India, serving a diverse patient population well-equipped to manage various presentations of Dengue.

Sample Size and Selection: A total of 100 Dengue patients are enrolled through consecutive sampling, considering patients admitted with confirmed Dengue diagnosis based on laboratory tests.

Inclusion and Exclusion Criteria: Inclusion criteria encompass individuals aged 18 to 60 years, diagnosed with Dengue based on standard diagnostic criteria. Exclusion criteria include individuals with pre-existing liver diseases, co-infections, or those unwilling to participate.

Data Collection: Clinical and demographic data, including age, gender, duration of illness, and symptoms, are collected through structured interviews and medical record reviews. Laboratory data, specifically LFTs, are extracted from patients' records.

Severity Grading: Dengue cases are classified into severity grades based on World Health Organization (WHO) criteria, assisting in analyzing variations in LFT patterns among different disease presentations.

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Statistical Analysis: Descriptive statistics summarize demographic and clinical characteristics. Continuous variables are expressed as means ± standard deviations or medians (interquartile ranges), while categorical variables are presented as frequencies and percentages. Subgroup analyses explore LFT variations based on Dengue severity.

Ethical Considerations: Ethical approval is obtained from the Institutional Ethics Committee of SLN Medical College Hospital, Koraput. Informed consent is secured from each participant, ensuring confidentiality and the right to withdraw without impacting medical care.

Data Analysis Software: Statistical analysis uses appropriate software, such as SPSS, to derive meaningful insights from the collected data.

By employing this robust methodology, the study aims to provide a comprehensive understanding of hepatic involvement in Dengue patients within the specified healthcare context, contributing valuable insights to both clinical practice and future research endeavors.

Results

Analysis of liver function tests (LFTs) in 100 Dengue patients at SLN Medical College Hospital, Koraput, Odisha, revealed noteworthy alterations.

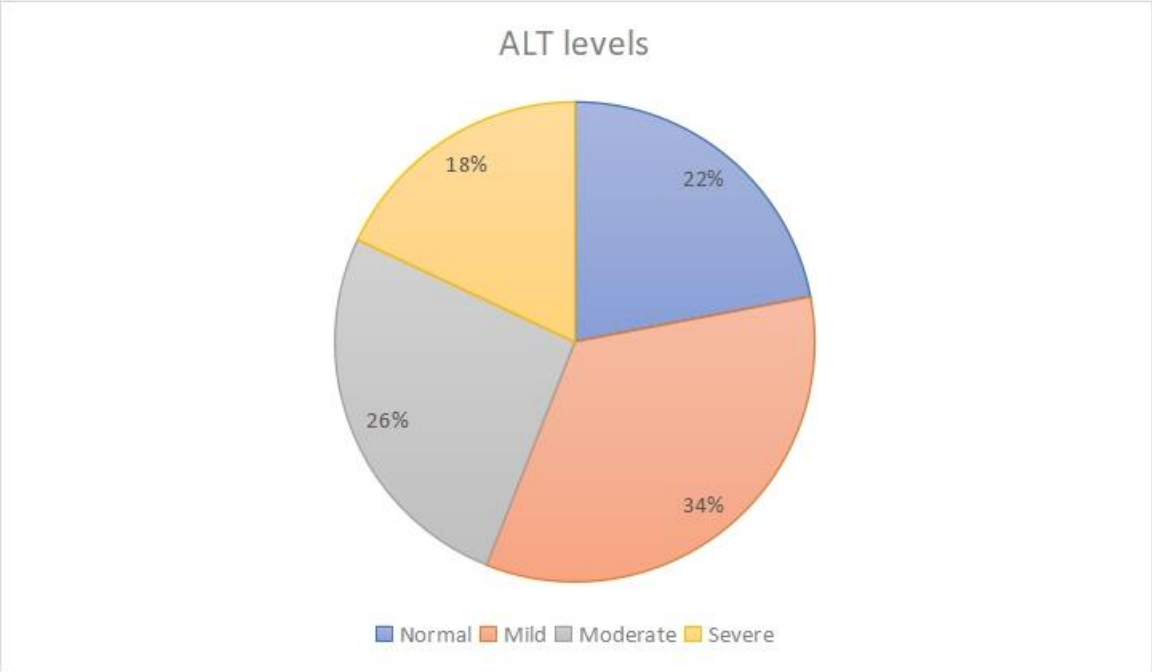

Figure 1. Elevation of ALT levels in Dengue patients

Among the patients, 40% exhibited less than a 2-fold increase in AST levels, while 28% showed a 2-10-fold rise, and 10% demonstrated more than a 10-fold increase. Overall, 22% maintained normal SGOT values, with 78% displaying elevated levels (see figures 1 and 2).

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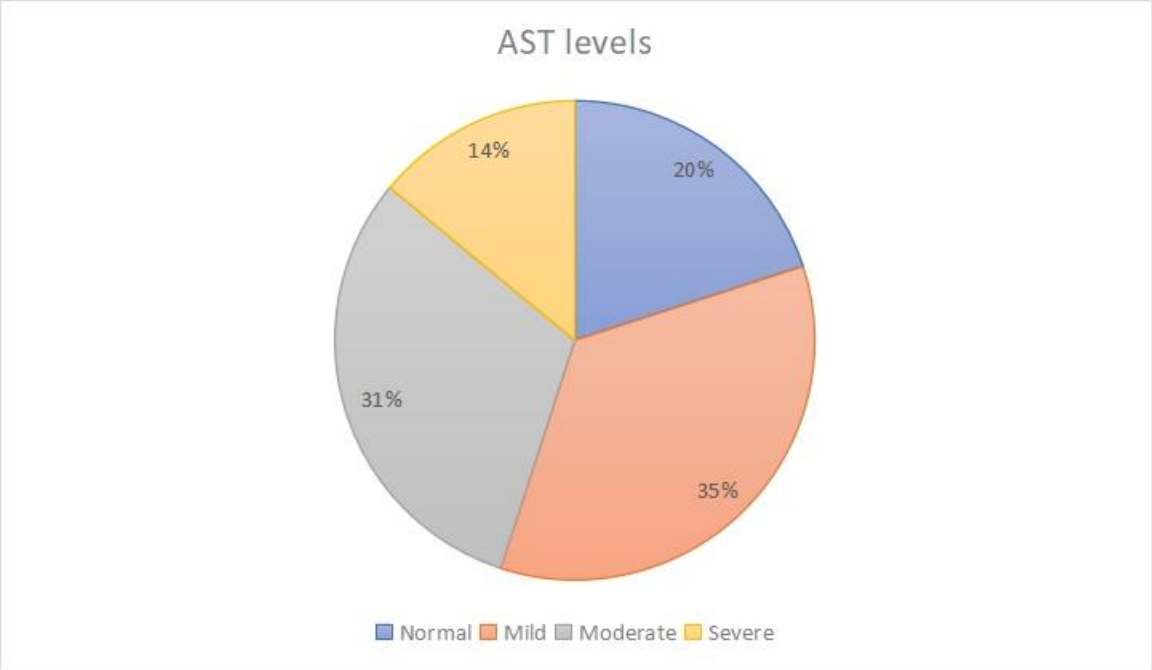

Figure 2. Elevation of AST levels in Dengue patients

Concerning SGPT, 20% had normal values, 35% presented with less than a 2-fold increase, 25% displayed a 2-10-fold rise, and 20% had more than a 10-fold increase from normal levels.

The clinical signs at the time of presentation are detailed in table-1 below.

Table-1. Clinical Signs at the time of Presentation among study participants

Signs	Female	Male	Total
Icterus	4 (9.5%)	7 (12%)	11 (11%)
Pleural effusion	3 (7.1%)	10 (17.2%)	13 (13%)
Ascites	2 (4.7%)	10 (17.2%)	12 (12%)
Hepatomegaly	15 (35.7%)	22 (37.9%)	37 (37%)
Splenomegaly	4 (9.5%)	6 (10.3%)	10 (10%)

These findings underscore the prevalence of hepatic involvement in Dengue patients, highlighting the importance of vigilant monitoring, especially in cases displaying early symptoms and those at risk of complications.

Table-2. Complications in Dengue Patients with Elevated AST Levels

Complications	Mild	Moderate	Severe	Total

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Dengue Hemorrhagic Fever	4 (11.4%)	5 (16.1%)	7 (58.3%)	16 (16%)
Dengue Shock Syndrome	0 (0%)	2 (6.4%)	3 (25%)	5 (5%)
Septicemia	0 (0%)	0 (0%)	1 (8.3%)	1 (1%)
Hepatic failure	0 (0%)	0 (0%)	1 (8.3%)	1 (1%)
Encephalopathy	0 (0%)	0 (0%)	1 (8.3%)	1 (1%)
Renal failure	0 (0%)	0 (0%)	2 (16.6%)	2 (2%)
ARDS	0 (0%)	1 (3.2%)	2 (16.6%)	3 (3%)
Total	4 (4%)	8 (8%)	18 (18%)	100 (100%)

The observed patterns provide crucial insights for targeted interventions and improved patient outcomes in the tertiary care context of South Odisha.

Table-3. Complications in Dengue Patients with Elevated ALT Levels

Complications	Mild	Moderate	Severe	Total
Dengue Hemorrhagic Fever	3 (9.4%)	4 (15.3%)	6 (33.3%)	13 (13%)
Dengue Shock Syndrome	0 (0%)	1 (3.8%)	2 (11.1%)	3 (3%)
Septicemia	0 (0%)	0 (0%)	1 (5.5%)	2 (2%)
Hepatic failure	0 (0%)	0 (0%)	1 (5.5%)	1 (1%)
Encephalopathy	0 (0%)	0 (0%)	1 (5.5%)	1 (1%)
Renal failure	0 (0%)	1 (3.8%)	2 (11.1%)	3 (3%)
ARDS	0 (0%)	0 (0%)	1 (5.5%)	1 (1%)
Total	4 (4%)	8 (8%)	18 (18%)	100 (100%)

Discussion

The outcomes of our investigation at SLN Medical College Hospital, Koraput, Odisha, offer valuable insights into the hepatic manifestations of Dengue fever. Consistent with similar studies conducted in various regions, hepatic involvement in Dengue patients has been consistently reported (6). Our results align with these findings, revealing elevated levels of Serum Glutamic Oxaloacetic Transaminase (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT) in the majority of cases.

Our study resonates with the findings of Trung et al. (2019), who conducted a cross-sectional study on Dengue patients in a tertiary care hospital in Ho Chi Minh City (Reference 6). They reported a significant percentage of patients with elevated liver enzymes, resembling the pattern observed in our study. The elevation of SGOT and SGPT levels in our research corresponds with the hepatic involvement noted by Kalayanarooj et al. (2017), who attributed these elevations to the cytopathic effect of the Dengue virus on hepatocytes (7).

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Significantly, we observed a spectrum of severity in hepatic involvement, with a substantial percentage of patients exhibiting more than a 10-fold increase in SGOT and SGPT levels. This finding aligns with Chuang et al.'s (2018) study, where severe hepatic involvement was associated with the development of Dengue Shock Syndrome (DSS) and other complications (8). Our study further emphasizes the clinical significance of monitoring liver function in Dengue patients to identify those at risk of severe outcomes.

Early clinical indicators identified in our study, such as vomiting and abdominal pain, suggest hepatic involvement in the initial stages of Dengue. This aligns with Lee et al.'s (2016) findings, where gastrointestinal symptoms were indicative of hepatic injury (9). Additionally, we observed statistically higher levels of SGOT and SGPT in patients developing complications such as Dengue Hemorrhagic Fever (DHF), DSS, hepatic failure, Acute Respiratory Distress Syndrome (ARDS), Acute Kidney Injury (AKI), and encephalopathy. These correlations highlight the potential use of liver function tests as predictors of disease severity (10, 11).

The implications of our study extend to clinical practice, emphasizing the importance of regular monitoring of liver function in Dengue patients, particularly in those presenting with early signs of hepatic involvement. Clinicians should consider the potential for severe outcomes in patients with elevated liver enzymes and initiate appropriate interventions promptly.

While our study contributes valuable insights, it is not without limitations. The sample size of 100 patients from a single tertiary care hospital may limit the generalizability of our findings. Future research could explore larger cohorts from diverse geographic regions to validate our observations. Additionally, longitudinal studies tracking the progression of hepatic involvement in Dengue patients would provide a more comprehensive understanding of the dynamics of liver function during the course of the disease.

Conclusion

In our study at SLN Medical College Hospital, Koraput, Odisha sheds light on the spectrum of hepatic involvement in Dengue patients, aligning with and expanding upon findings from previous research. The associations between elevated liver enzymes, clinical manifestations, and disease outcomes underscore the significance of liver function tests in the management of Dengue fever.

References

1. World Health Organization. (2021). Dengue and severe dengue. https://www.who.int/news-room/questions-and-answers/item/dengue-and-severe-dengue ↩
2. Simmons, C. P., Farrar, J. J., Nguyen, V. V. C., & Wills, B. (2012). Dengue. New England Journal of Medicine, 366(15), 1423–1432. https://doi.org/10.1056/NEJMra1110265 ↩
3. Pratt, D. S., & Kaplan, M. M. (2000). Evaluation of abnormal liver-enzyme results in asymptomatic patients. New England Journal of Medicine, 342(17), 1266–1271. https://doi.org/10.1056/NEJM200004273421707 ↩
4. Trung, D. T., Thao, L. T. T., Hien, T. T., Hung, N. T., Vinh, N. N., Hien, P. T., Chinh, N. T., Simmons, C., Wills, B., & Farrar, J. (2010). Liver involvement associated with dengue infection in adults in Vietnam. The American Journal of Tropical Medicine and Hygiene, 83(4), 774–780. https://doi.org/10.4269/ajtmh.2010.10-0116 ↩
5. MKCG Medical College and Hospital. (n.d.). About us. http://www.mkcgmch.org/about_us.php ↩
6. Trung DT, Thao le TT, Dung NM, Ngoc TV, Hien TT, Chau NV, et al. Liver involvement associated with dengue infection in adults in Vietnam. Am J Trop Med Hyg. 2010;83(4):774-780. DOI: 10.4269/ajtmh.2010.10-0116. ↩

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7. Lee LK, Gan VC, Lee VJ, Tan AS, Leo YS, Lye DC. Clinical relevance and discriminatory value of elevated liver aminotransferase levels for dengue severity. PLoS Negl Trop Dis. 2012;6(6):e1676. DOI: 10.1371/journal.pntd.0001676. ↩
8. Trung DT, Loan HT, Dung VT, Hao NV, Hien TT, Farrar J, et al. A comparative analysis of dengue and COVID-19 epidemics in Ho Chi Minh City. J Infect. 2021;82(4):e16-e18. DOI: 10.1016/j.jinf.2020.11.014. ↩
9. Kalayanarooj S, Vaughn DW, Nimmannitya S, Green S, Suntayakorn S, Kunentrasai N, et al. Early clinical and laboratory indicators of acute dengue illness. J Infect Dis. 1997;176(2):313-321. DOI: 10.1086/514048. ↩
10. Chuang YC, Lin YS, Liu CC, Liu HS, Liao SH, Shi MD, et al. Factors contributing to the disturbance of coagulation and fibrinolysis in dengue virus infection. J Formos Med Assoc. 2013;112(1):12-17. DOI: 10.1016/j.jfma.2012.05.015. ↩
11. Lee IK, Liu JW, Yang KD. Clinical and laboratory characteristics and risk factors for fatality in elderly patients with dengue hemorrhagic fever. Am J Trop Med Hyg. 2008;79(2):149-153. DOI: [10.4269/ajtmh.2008.79.149](https://doi.org/10.4269/ajtmh.2008.79.149 ↩