"CARDIAC MANIFESTATION OF DENGUE FEVER - A CROSS-SECTIONAL STUDY"

Dr. Katrodiya Hiren Mavjibhai, Dr. Sarveswaraiah J[2]*

[1]Post Graduate Student,

[2]Asst.Professor, Department of Medicine, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

Corresponding Author and reprint request to: Dr. Sarveswaraiah J[2], Asst.Professor, Department of Medicine, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, India

Mail ID: doctorsarveswaraiah@gmail.com

Abstract

Background: Dengue fever is a major mosquito-borne viral illness with increasing incidence in tropical countries. Apart from classical manifestations, dengue may involve multiple organs including the cardiovascular system. Cardiac manifestations range from asymptomatic electrocardiographic abnormalities to myocarditis, arrhythmias, left ventricular dysfunction, and cardiogenic shock. Early identification of cardiac involvement is important for appropriate management and prevention of complications.

Aim:: To evaluate the pattern and prevalence of cardiac manifestations in adult patients with dengue fever admitted to a tertiary care hospital.

Objective: To assess electrocardiographic abnormalities in dengue patients.

- To evaluate echocardiographic changes in dengue fever. • To determine the association of cardiac enzyme abnormalities with severity of dengue.
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Materials and Methods: This hospital-based cross-sectional study was conducted in the Department of General Medicine, Rohilkhand Medical College & Hospital, Bareilly, Uttar Pradesh. Adult patients diagnosed with dengue fever based on serological confirmation were included in the study. Detailed clinical evaluation, laboratory investigations, serial electrocardiography, cardiac enzyme assessment, and echocardiography were performed. Statistical analysis was carried out using SPSS software. A p-value <0.05 was considered statistically significant.

Results: Cardiac manifestations were observed in a significant proportion of dengue patients. The most common ECG abnormality was sinus bradycardia followed by ST-T changes and atrioventricular conduction disturbances. Echocardiography revealed transient left ventricular dysfunction and mild

pericardial effusion in selected patients. Elevated cardiac biomarkers were associated with severe dengue and warning signs. Most abnormalities were transient and resolved with supportive treatment.

Conclusion: Cardiac involvement in dengue fever is common and often subclinical. Serial ECG monitoring and selective echocardiographic evaluation aid in early recognition of myocardial involvement. Early diagnosis and appropriate monitoring can improve clinical outcomes in dengue patients.

Key Words: Dengue fever, myocarditis, cardiac manifestations, electrocardiography, echocardiography, arrhythmia.

Introduction Dengue fever is an acute systemic viral illness caused by four antigenically distinct serotypes of dengue virus belonging to the Flaviviridae family. It is one of the most important mosquito-borne diseases affecting tropical and subtropical countries. The disease spectrum ranges from asymptomatic infection and uncomplicated febrile illness to severe dengue associated with plasma leakage, shock, hemorrhage, and multi-organ dysfunction.

Cardiac involvement in dengue has increasingly gained attention over the last decade. The cardiovascular manifestations include myocarditis, arrhythmias, conduction abnormalities, pericardial effusion, and transient ventricular dysfunction. These manifestations may remain asymptomatic or present with hemodynamic instability and cardiogenic shock.

The exact mechanism of myocardial involvement remains multifactorial and includes direct viral invasion, cytokine-mediated inflammation, endothelial dysfunction, and metabolic derangements. Electrocardiographic abnormalities such as sinus bradycardia, atrioventricular block, and nonspecific ST-T changes are commonly observed. Echocardiography may reveal reduced left ventricular ejection fraction, global hypokinesia, and pericardial effusion.

Early recognition of cardiac involvement is clinically important because myocardial dysfunction complicates fluid management and increases morbidity in dengue patients. Therefore, the present study was undertaken to evaluate cardiac manifestations in adult dengue patients admitted to a tertiary care hospital.

II. Aim and Objectives

Aim To study cardiac manifestations in patients with dengue fever.

Objectives

1. To determine electrocardiographic abnormalities in dengue fever.

2. To evaluate echocardiographic findings in dengue patients.

3. To assess cardiac biomarker abnormalities in dengue fever.

4. To correlate cardiac involvement with severity of dengue infection.

III. Materials & Methods

This cross-sectional study was conducted in the Department of General Medicine, Rohilkhand Medical College & Hospital, Bareilly, Uttar Pradesh.

Study Design

Hospital-based cross-sectional observational study.

Study Population

Adult patients admitted with confirmed dengue fever.

Inclusion Criteria

1. Patients aged more than 18 years.

2. Serologically confirmed dengue infection.

3. Patients willing to participate in the study.

Exclusion Criteria

1. Pre-existing structural heart disease.

2. Known ischemic heart disease.

3. Chronic renal failure.

4. Thyroid disorders associated with arrhythmias.

5. Patients unwilling to participate.

Methodology

All eligible patients underwent:

Detailed clinical history and examination.

Routine hematological and biochemical investigations.

Dengue serology.

Serial electrocardiography.

Cardiac enzyme analysis (CK-MB/Troponin).

Two-dimensional echocardiography.

Statistical Analysis

Data were entered and analyzed using SPSS software. Descriptive statistics were expressed as mean ± standard deviation and percentages. Appropriate statistical tests were applied. A p-value <0.05 was considered statistically significant.

IV. Results

Chart 1: Distribution of ECG Abnormalities in Dengue Patients

ECG Pattern among Study Population

ECG Pattern	Number (n)	Percentage (%)
Normal	127	66.1%
Sinus Bradycardia	27	14.1%
Tachycardia	10	5.2%
ST–T changes	22	11.5%
Hear block	6	3.1%

Electrocardiographic analysis showed a normal ECG pattern in 66.1% of participants. Among the abnormalities, sinus bradycardia was most frequent (14.1%), followed by ST–T changes (11.5%), tachycardia (5.2%), and heart block (3.1%).

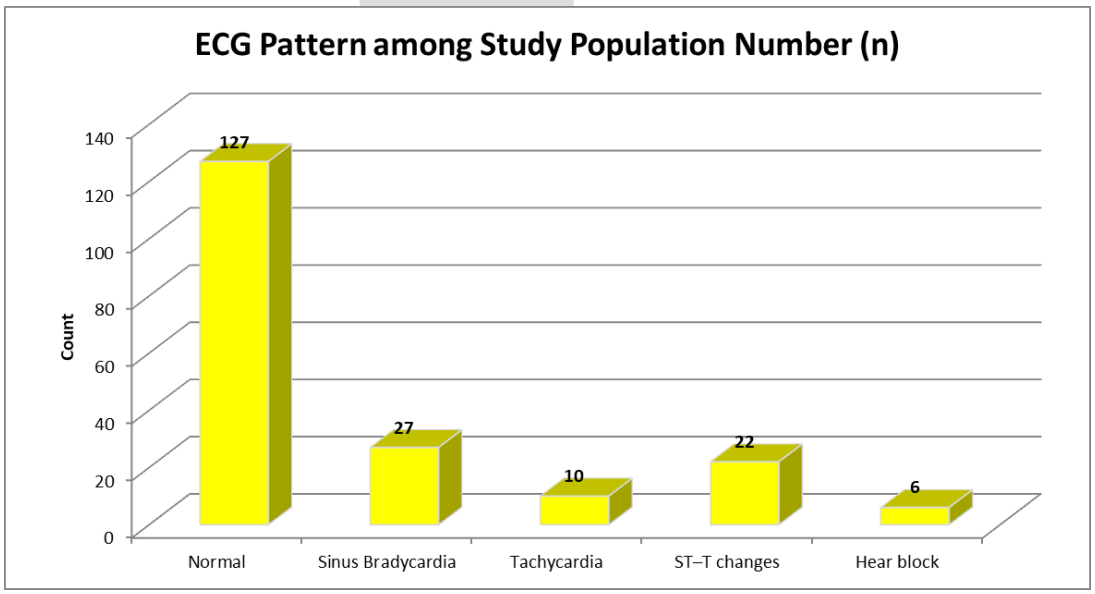

Figure : ECG Pattern among Study Population

Diagram 1: Mechanism of Cardiac Involvement in Dengue

Dengue Virus Infection

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Cytokine Release & Immune Activation

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Endothelial Dysfunction & Plasma Leakage

↓

Myocardial Inflammation

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ECG Changes / Myocarditis / LV Dysfunction

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Arrhythmias & Hemodynamic Instability

Chart 2: **Echocardiographic Findings**

Echocardiographic (Echo) Pattern

Echo Pattern	**Number (n)**	**Percentage (%)**
Normal	132	68.8%
LV Dysfunction	28	14.6%
RWMA	8	4.2%
Pericardial effusion	1	9.4%
Dilated Chamber	6	3.1%

Echocardiographic evaluation revealed normal findings in 68.8% of participants. Among abnormal patterns, left ventricular (LV) dysfunction was the most common (14.6%), followed by pericardial effusion (9.4%), regional wall motion abnormality (RWMA) (4.2%), and chamber dilatation (3.1%).

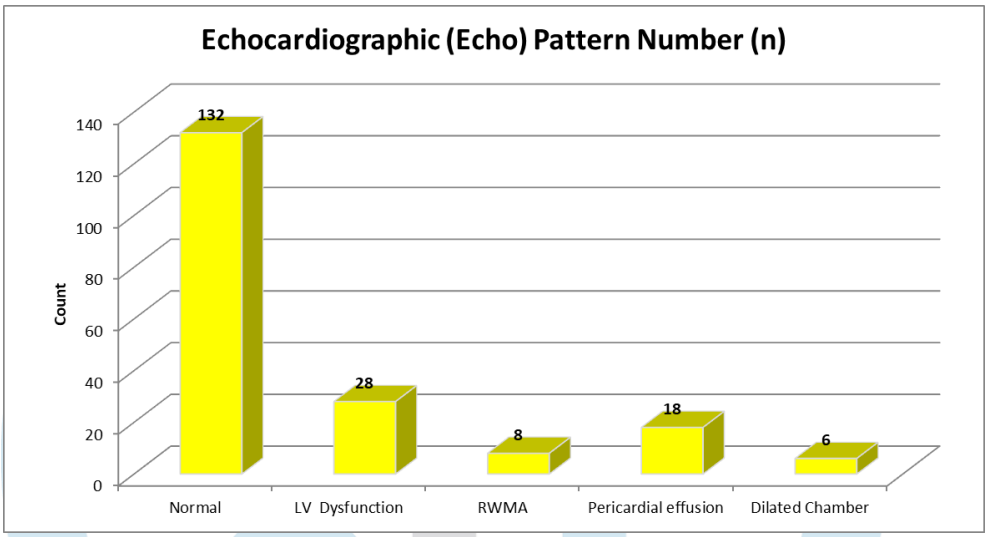

Figure : Echocardiographic (Echo) Pattern

Chart 3: Cardiac Biomarker Elevation

Biomarker	**Mean ± SD**
CK Total (IU/L)	187 ± 39.4
CK-MB (IU/L)	39.2 ± 20.1
Troponin I (ng/mL)	0.0311 ± 0.0289

The cardiac biomarker profile showed a mean CK Total level of 187 ± 39.4 IU/L and a CK-MB value of 39.2 ± 20.1 IU/L, indicating mild enzymatic elevation in the cohort. Troponin I levels averaged 0.0311 ± 0.0289 ng/mL, remaining within a low range, suggesting no significant myocardial injury among the participants.

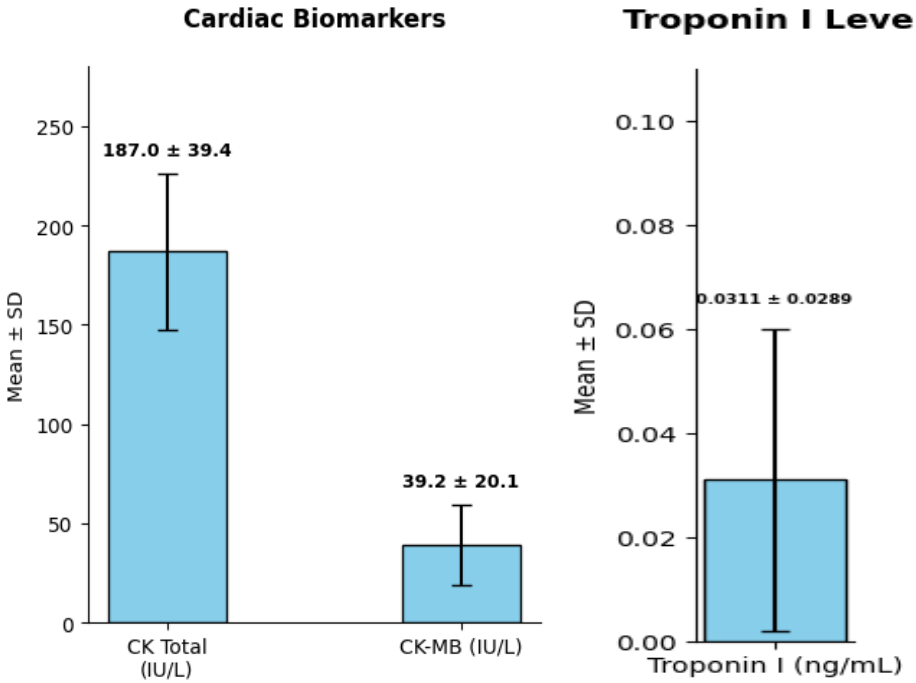

Figure: Cardiac Biomarkers

V. Discussion

The present study demonstrated that cardiac involvement in dengue fever is not uncommon and may range from asymptomatic ECG changes to clinically significant myocarditis.

Sinus bradycardia was the most frequently observed electrocardiographic abnormality, consistent with previous studies. Most rhythm abnormalities were transient and resolved during recovery.

Echocardiographic abnormalities such as reduced left ventricular ejection fraction and mild pericardial effusion were observed in selected patients, supporting the concept of transient myocardial dysfunction in dengue infection.

Elevated cardiac biomarkers in severe dengue indicate myocardial injury and emphasize the importance of cardiac monitoring in patients with warning signs and severe disease.

The findings of this study correlate with previous Indian and international studies reporting transient cardiac involvement in dengue fever.

VI. Conclusion

Cardiac manifestations in dengue fever are relatively common and often remain subclinical. Serial ECG monitoring and echocardiographic evaluation are useful tools for early detection of myocardial involvement. Recognition of cardiac dysfunction is essential for proper fluid management and prevention of complications in severe dengue.

VII. Limitations

1. Single-center study.

2. Limited sample size.

3. Advanced cardiac imaging modalities were not available.

4. Long-term follow-up was not performed.

VIII. Recommendations

1. Routine ECG screening should be considered in hospitalized dengue patients.

2. Echocardiography should be performed in patients with warning signs or abnormal ECG findings.

3. Larger multicentric studies are required to establish the true prevalence of cardiac involvement in dengue.

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