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ORIGINAL RESEARCH

ASSESSMENT OF ECG MANIFESTATION OF DENGUE FEVER

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ABSTRACT

Background: Dengue is a febrile illness caused by infection with 1 of 4 dengue viruses transmitted by the Aedes mosquito. The present study was conducted to assess ECG manifestation of dengue fever.

Materials & Methods: 82 dengue fever patients were enrolled in study. Clinical features and ECG changes such as sinus bradycardia, sinus tachycardia, non- specific ST changes and RBBB were recorded.

Results: Out of 82 patients, males were 50 and females were 32. We observed that common clinical features were fever in 75, myalgia in 23, headache in 41, abdominal pain in 32, rashes in 15, arthritis in 17, palpitations in 20 and diarrhoea in 5 cases. We found that common ECG changes were sinus tachycardia in 6, sinus bradycardia in 30, non- specific ST changes in 12 and RBBB in 4 cases. The difference was significant (P< 0.05).

Conclusion: Common ECG abnormality in patients with dengue fever was sinus bradycardia.

Key words: ECG, Dengue, cardiovascular system

Introduction

Dengue is a febrile illness caused by infection with 1 of 4 dengue viruses transmitted by the Aedes mosquito, with dengue virus 2 having the highest risk for severe infection.[1,2] It is an arboviral disease of a significant burden in tropical countries with an increasing prevalence: the global estimate of dengue infections was approximately 75 million in 1997 and approximately 150 million in 2008. This increase is secondary to poor hygiene, inadequate health systems, and increased international travel, which has facilitated Aedes mosquito proliferation. Seventy percent of cases are in Asia, with India alone having 34% of the global total.[3]

Dengue is known to affect various systems, cardiovascular system is one of them. Cardiac complications of dengue fever though uncommon, have been reported as burden of disease is increasing.[4] A variety of cardiac complications have been recognized, the most common being the myocarditis, though conduction defect and arrhythmia have also been reported.[5] The pathophysiology of cardiac involvement in dengue is not clearly understood it is either from direct viral invasion of cardiac muscles or cytokine induced immune damage or both. It may be either focal or diffuse myocarditis. Various studies have demonstrated cardiac abnormalities and ECG changes in dengue patients.[6] The present study was conducted to assess ECG manifestation of dengue fever.

Materials & Methods

The present study comprised of 82 dengue fever patients with high grade fever for 1 to 5 days with Both primary dengue (NS-1 Antigen and dengue IgM positive) secondary dengue (IgM and IgG positive) patients.

Data such as name, age, gender etc. was recorded. Parameters such as clinical features and ECG changes such as sinus bradycardia, sinus tachycardia, non- specific ST changes and RBBB was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 82		
Gender	**Males**	**Females**
Number	50	32

Table I shows that out of 82 patients, males were 50 and females were 32.

Table II Assessment of clinical features

Clinical features	Number	P value
Fever	75	0.01
Myalgia	23	
Headache	41	
Abdominal pain	32	
Rashes	15	
Arthritis	17	
Palpitations	20	
Diarrhoea	5	

Table II, graph I shows that common clinical features were fever in 75, myalgia in 23, headache in 41, abdominal pain in 32, rashes in 15, arthritis in 17, palpitations in 20 and diarrhoea in 5 cases. The difference was significant (P< 0.05).

Graph I Assessment of clinical features

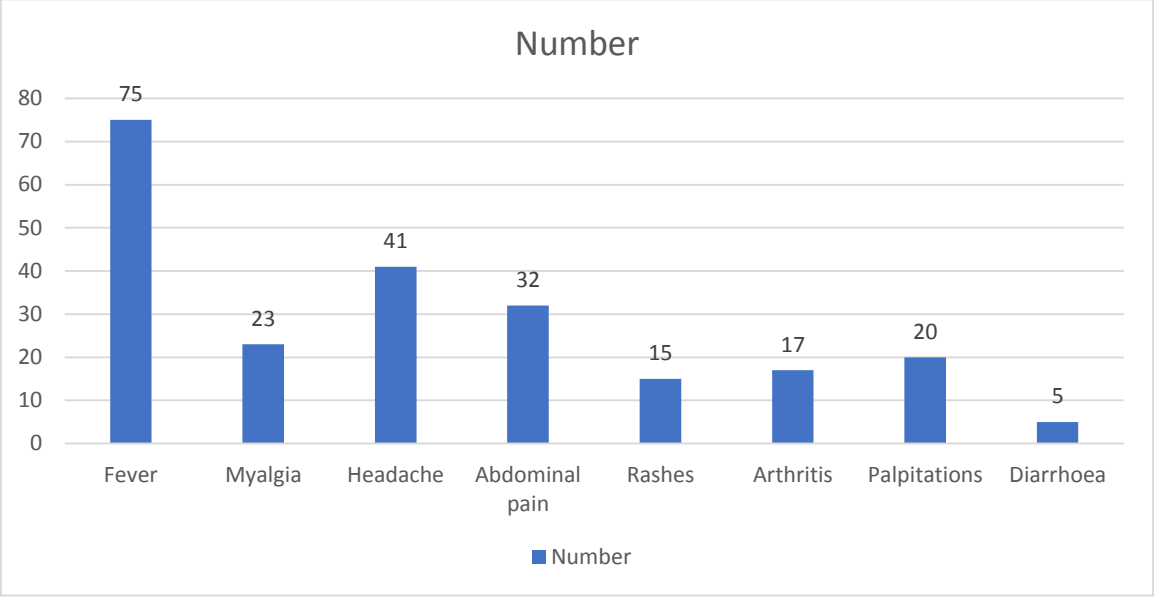

Table III ECG changes

ECG changes	Number	P value
Sinus tachycardia	6	0.02
Sinus bradycardia	30	
Non- specific ST changes	12	
RBBB	4	

Table III shows that common ECG changes were sinus tachycardia in 6, sinus bradycardia in 30, non-specific ST changes in 12 and RBBB in 4 cases. The difference was significant (P< 0.05).

Discussion

Dengue viral infection cause myocardial damage either by infection or by an autoimmune reaction resulting in myocardial inflammation.[7] The cardiac abnormalities in dengue are invariably benign, transient and self- limiting and attributed to subclinical viral myocarditis. Clinical manifestations in adult patients may differ from child patients, and the data are still limited. Severe infection, DHF, or dengue shock syndrome (DSS) were more prevalent in adults than in children.[8] Liver involvement is common in dengue infection, including hepatomegaly, jaundice, abnormal liver enzymes (60%), and acute severe hepatitis with an at least 10 times elevated level of transaminase.[9] The present study was conducted to assess ECG manifestation of dengue fever.

We found that out of 82 patients, males were 50 and females were 32. Lateef et al[10] showed sinus bradycardia is commonest rhythm abnormality (32%). Study done by H Poornima[11] showed that out of 341 dengue patients 72 patients had abnormal ECG (21.11%) in which sinus bradycardia was the commonest abnormality and was observed in 30 patients. ST was present in 8 patients (2.3%). Krishna et al[12] observed the presence of electrocardiographic (ECG) changes in patients presenting with dengue fever. Out of 108 patients, 56 patients had normal ECG. Abnormal ECG findings like sinus bradycardia, tachycardia, ST-T changes, bundle branch block were noted among 52 patients.

We observed that common clinical features were fever in 75, myalgia in 23, headache in 41, abdominal pain in 32, rashes in 15, arthritis in 17, palpitations in 20 and diarrhoea in 5 cases. We found that common ECG changes were sinus tachycardia in 6, sinus bradycardia in 30, non- specific ST changes in 12 and RBBB in 4 cases. The pathophysiology of cardiac disease in dengue infection is unclear. A variety of factors contribute to its pathogenesis, which results in myocardial injury and subsequent conduction abnormalities. Direct viral invasion of cardiac muscles, cytokine-induced immunological injury, or both can cause cardiac involvement. Electrolyte imbalance, calcium homeostasis disruption, lactic acidosis, and ischemia due to hypotension are all thought to play a role in the myocardial dysfunction seen in dengue patients. Increased levels of proinflammatory cytokines, vasoactive mediators, and cytotoxic factors in dengue patients can increase vascular permeability and result in shock.[13] These can further impede coronary blood supply, resulting in a cascade of ischemia and subsequent electrophysiological changes. Pericardial effusion is caused by increased vascular permeability and abnormal plasma leakage. It is unclear whether the myocyte injury is caused by a direct invasion of the DENV virus or by an immune-mediated mechanism. On cardiac specimens from dengue patients, viral antigens such as dengue capsid protein, non-structural protein 1 (NS1), and viral RNA were identified using reverse transcription polymerase chain reaction.

Arrhythmias are of fairly common occurrence in dengue infection, and multiple factors are predicted to interplay in its pathogenesis. Firstly, changes in membrane potential can occur as a result of inflammatory processes and cytokine storms affecting myocytes and the interstitium. Arrhythmias can also be triggered by changes in ventricular dynamics, such as increased wall strain and myocardial oxygen demand. Moreover, there is a risk of bleeding in or around the sinoatrial or atrioventricular node due to low platelet counts, which can cause conduction defects and arrhythmias.[14]

The limitation the study is small sample size.

Conclusion

Authors found that common ECG abnormality in patients with dengue fever was sinus bradycardia.

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