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Study of cardiac Manifestation in Dengue fever among South Karnataka Population

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Abstract

Background: Myocardial dysfunction in acute dengue has been documented as it causes fulminant cases such as fatal myocarditis as a sequelae of acute illness.

Method: 40 (forty) adult patients aged between 20 to 45 were studied. Rapid test detection Non-structural protein-1 (NS1) and / or IgM antibody Elisa test Routine haemogram, LFT, Renal function test, chest-x-ray, USG abdomen. ECG test was performed in every patient and corroborated with clinical manifestation of Dengue fever.

Results: Clinical manifestation was as per WHO guide lines. Major features were 20 (50%) abdominal pain, 16 (40%) persistent vomiting 15 (37.5%) Mucosal bleeding 12 (30%) Fluid accumulation 10 (25%) shock and ARDS, ECG had major features were 11 (15%) sinus tachycardia 30 (75%) sinus Bradycardia, 5 (12.5%) sinus rhythm, 6 (15%) first degree heart block.

Conclusion: The spectrum of cardio vascular manifestations in dengue is broad ranging from myocardial impairment, arrhythmias to vascular barrier dysfunction. Hence such patient has to be treated meticulously to avoid significant morbidity and mortality.

Keywords: Rapid test detection IgM, ECG, Troponin T, DSS, South Karnataka.

Introduction

Dengue fever is one of the most important infectious disease in India. The dengue virus (DENV) a member of the genus Flavivirus in the family Flaviviridae, a single – stranded enveloped RNA virus of which four distinct, but related, serotype exist (DENV 1-4) ⁽¹⁾. Although the vast majority of DENV infections are either asymptomatic or results in fairly mild disease, an estimated 1-5% of patients presenting to hospital develop complications, including organ impairment bleeding and plasma leakage from the capillaries ⁽²⁾. In severe cases leakage can result in potentially fatal cardio vascular collapse i.e., Dengue shock syndrome (DSS) ⁽³⁾. The increase of capillary permeability can cause intravascular hypovolemia and shock is best known as cardio vascular complication associated with Dengue. Additionally, various specific cardiac manifestations have been observed ranging from fulminate myocarditis to myocardial impairment, arrhythmias, and myocardial depressant factors ⁽⁴⁾. Hence myocardial involvement of dengue fever are associated with vascular and endothelial dysfunction. Hence various clinical manifestations were correlated and observed through ECG changes.

Material and Method

40 (forty) patients aged between 20 to 45 years admitted at Medicine department of Dr. B R Ambedkar Medical College Gandhi Nagar, Kadugondana Halli Bangalore-5600045 Karnataka and other outpatient facilities where the primary investigator attends, were studied.

Inclusive Criteria: The patients above 18 years fulfilling the WHO criteria for dengue. Confirmed Dengue serologically positive

Exclusion Criteria: Patients taking medication which can affect the heart rate. Patients having cardiovascular diseases (acquired or congenital) patients having electrolytic disorders like tachycardia, convulsion or seizures, Nausea, Vomiting, diarrhoea or constipation.

Method: Rapid test detection of Non-structural protein 1 (NS1) and / or immunoglobulin M (IgM) antibody on patient's serum. Routine bio-chemical parameters like complete haemogram, liver function test, renal function test electrolytes test were carried out in each patient. Chest-x-ray and USG abdomen were also done, ECG was done in all patients for three consecutive days. If ECG was abnormal, daily monitoring was continued.

Electrocardiogram and Troponin T were evaluated in all the patients with clinical features relating to CVD like chest pain, dyspnoea, palpitation or abnormalities in heart rate and rhythm were analysed clinically and corroborated with manifestation of dengue fever. Duration of study was from June-2016 to July-2018.

Statistical analysis: Various clinical manifestations of dengue fever, ECG changes prevalence of clinical manifestation in ECG abnormalities were classified with percentage. The statistical analysis was carried out in SPSS software. The ratio of male and female was 2:1.

Observation and Results

Table-1: Clinical manifestation in Dengue fever patients – 16 (40%) had persistent vomiting, 20 (50%) had abdominal pain, 15 (37.5%) had mucosal bleeding, 12 (30%) had fluid accumulation, 11 (27.5%) had lethargy/ restlessness, 7 (17.5%) had hepatomegaly 10 (25%) had shock, 8 (20%) had respiratory distress, 10 (25%) had ARDS.

Table-2: Study of ECG changes in Dengue fever patients – 5 (12.5%) had sinus rhythm, 29 (72.5%) had sinus Bradycardia, 11 (27.5%) sinus tachycardia, 6 (15%) had first degree heart block.

Table-3: Prevalence of clinical manifestation of Dengue fever 9 (22.5%) had persistent vomiting, 11 (27.5%) had abdominal pain, 5 (12.5%) had mucosal bleed, 7 (17.5%) had fluid accumulation, 6 (15%) had restlessness, 2 (5%) had hepatomegaly, 8 (20%) had shock, 4 (10%) had respiratory distress, 5 (12.5%) had ARDS.

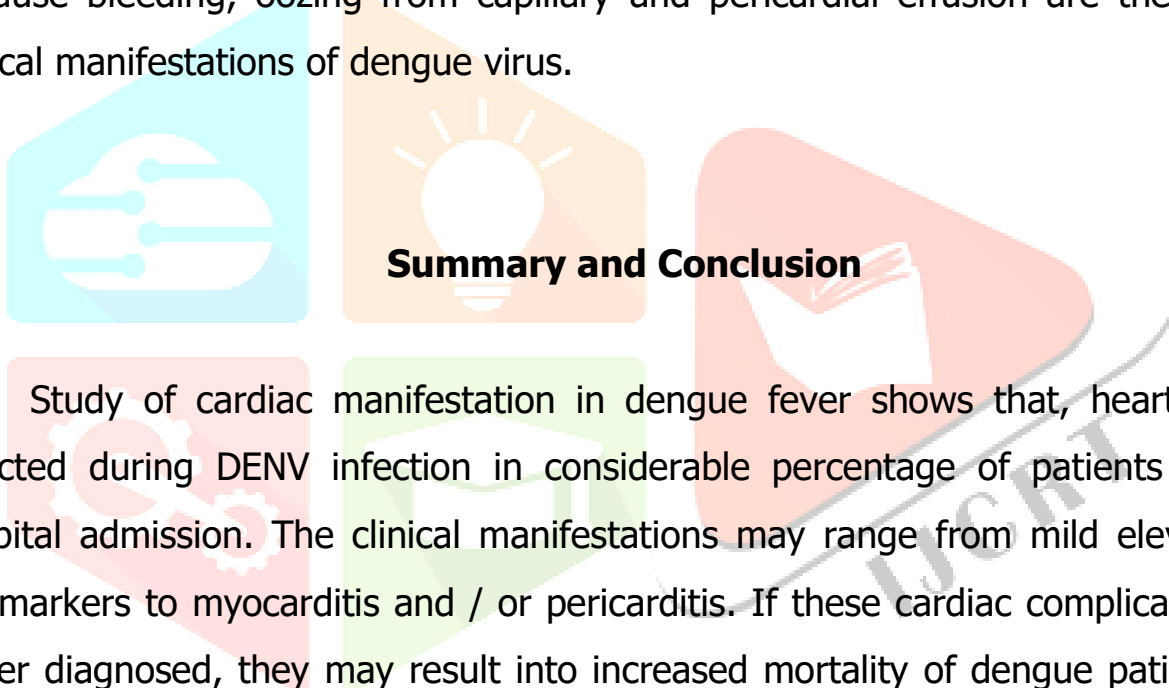
Discussion

In the present study 9 (22.5%) showed persistent vomiting, 20 (50%) abdominal pain, 15 (37.5%) mucosal Bleed, 12 (30%) fluid accumulation, 11 (27.5%) lethargy / restlessness, 7 (17.5%) Hepatomegaly, 10 (25%) shock, 8 (20%) respiratory distress, 10 (25%) ARDS (Table-1) The ECG changes were 5 (12.5%) sinus rhythm, 29 (72.5%) sinus Bradycardia, 11 (27.5%) sinus tachycardia, 6 (15%) First degree heart block (Table-2).

It was reported that, 25% Dengue patients had more elevated markers of myocardial injury such as myoglobin, CK-MB, Troponin-T, NT-pro BNP and / or heart type fatty acid binding protein levels (h-FABP). They showed more intense inflammatory activity confirmed by higher leukocyte count and C-reactive protein levels. In agreement with this inflammatory activity a lower viral load was observed. It might be secondary to dengue virus has a pivotal role in the pathophysiology of the cardiac disease and myocardial injury could be an immune mediated event ⁽⁸⁾. Cardiac involvement in dengue fever is frequent in secondary infection. There are few reports of heart failure and cardiogenic shock during dengue virus infection. Dengue can cause a severe form of circulatory shock due to an important plasma leakage associated with bleeding and haemo-concentration ⁽⁹⁾. The cardiac involvement was considered the aetiology of shock. There was no

evidence bacterial or fungal infection in either blood cultures or any organs ruling out septic shock as the cause for this hemodynamic involvement.

On autopsy, the histological findings of myocardium of the patients with dengue fever had interstitial oedema with inflammatory cell infiltration and necrosis of myocardial fibres. In some cases there was evidence of pericarditis. Myocardial damage in dengue could be of inflammatory mediators or by the direct action of the virus on cardiomyocytes⁽¹⁰⁾. Some dengue patients having pericardial involvement presented with clinical findings of cardiac tamponade signs that resolved completely after pericardiocentesis⁽¹¹⁾. Hence it can be hypothesized that, secondary infection of Dengue virus mainly targets cardio – vascular system because bleeding, oozing from capillary and pericardial effusion are the primary clinical manifestations of dengue virus.



Study of cardiac manifestation in dengue fever shows that, heart can be affected during DENV infection in considerable percentage of patients needing hospital admission. The clinical manifestations may range from mild elevation of bio markers to myocarditis and / or pericarditis. If these cardiac complications are under diagnosed, they may result into increased mortality of dengue patients due to dengue associated vasculopathy which is likely to be multi-factorial, including a variety of host and viral factors.

Table – 1
Clinical Manifestation of Dengue fever

Sl No	Clinical Manifestations	No of Patients (40)	Percentage %
1	Persistent vomiting	16	40 %
2	Abdominal pain	20	50 %
3	Mucosal Bleed	15	37.5 %
4	Fluid Accumulation	12	30 %
5	Lethargy / restlessness	11	27.5 %
6	Hepatomegaly	10	25 %
7	Shock	10	25 %
8	Respiratory Distress	8	20 %
10	ARDS	10	25 %

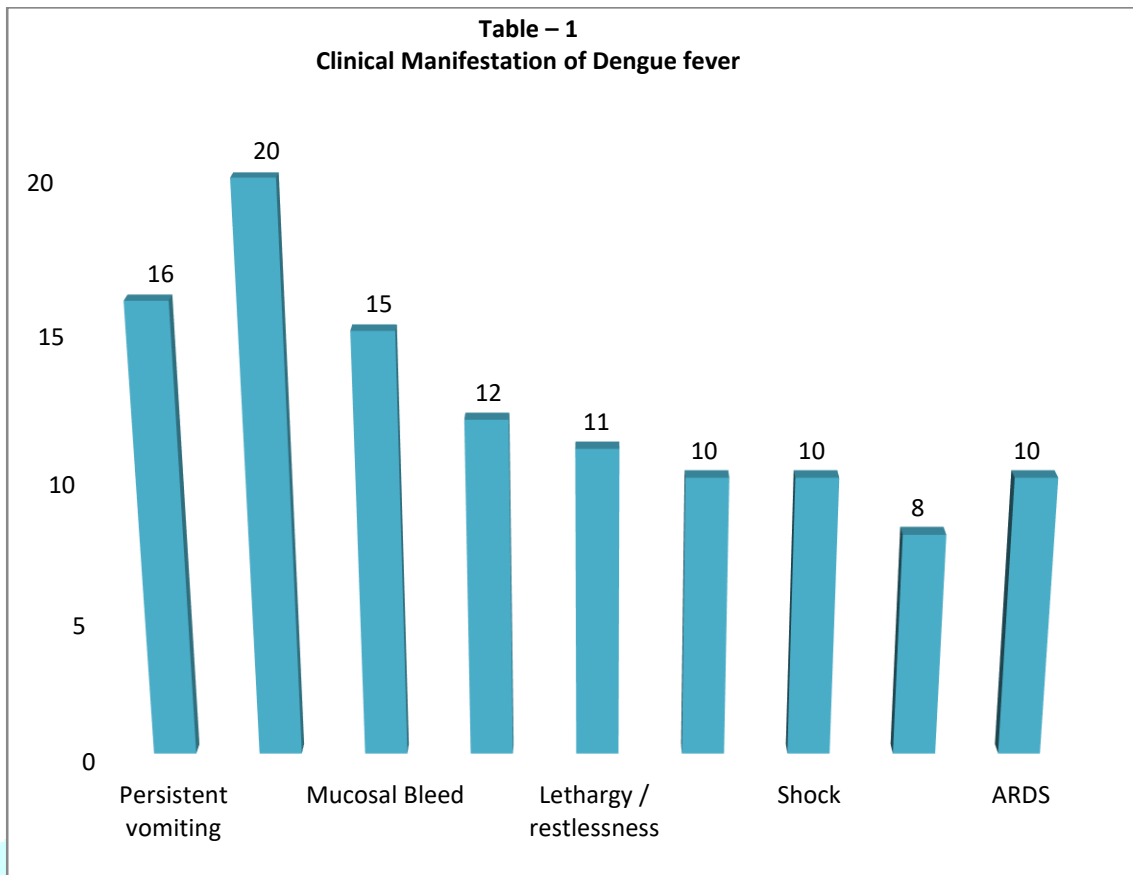
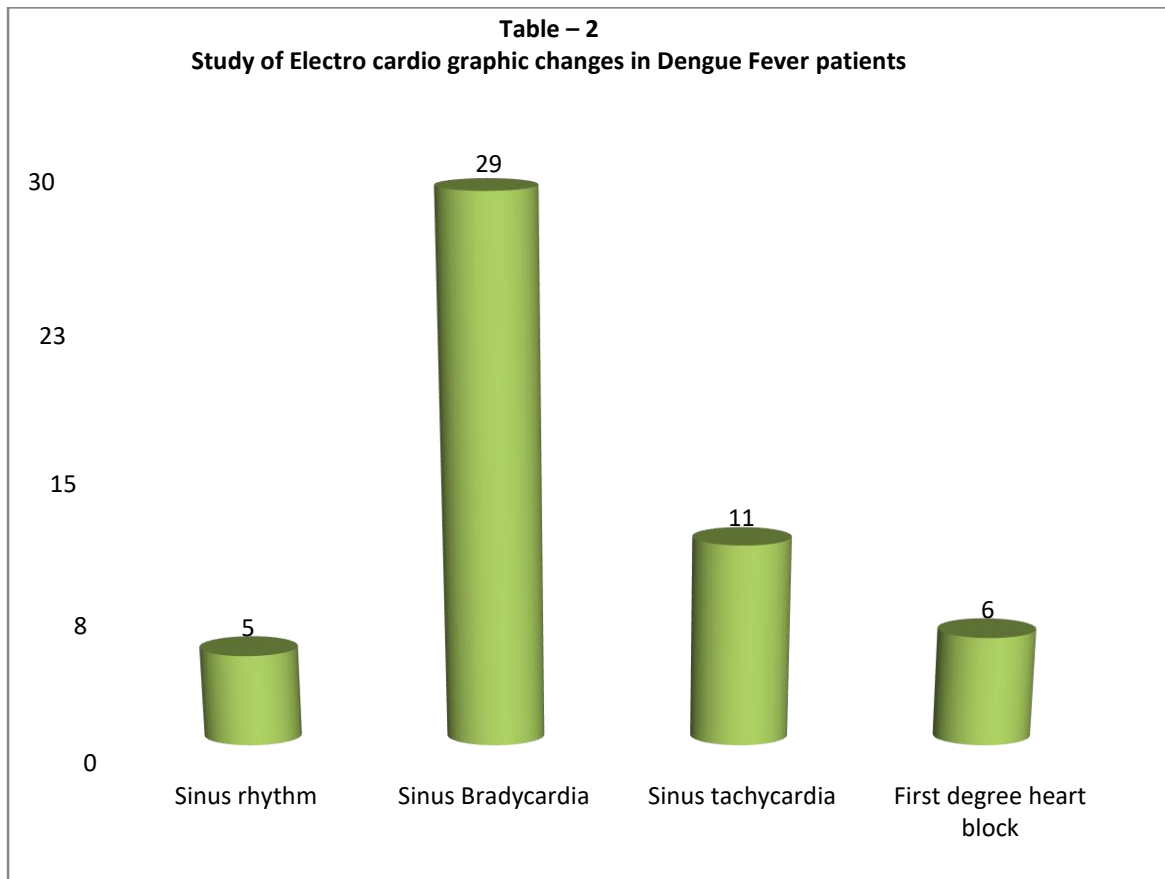


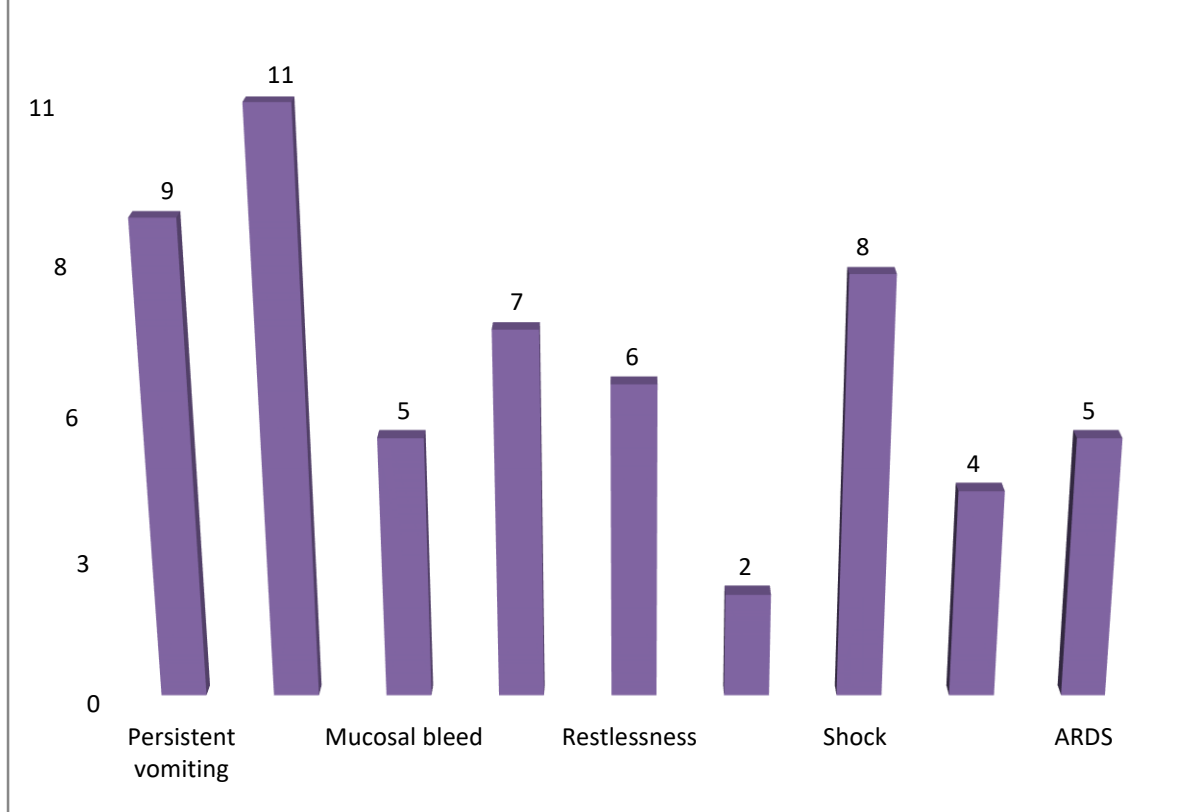
Table – 2
Study of Electro cardio graphic changes in Dengue Fever patients

Sl. No	ECG Changes	No. of Patients	Percentage %
1	Sinus rhythm	5	12.5 %
2	Sinus Bradycardia	29	72.5 %
3	Sinus tachycardia	11	27.5%
4	First degree heart block	6	15 %

**Table – 3****Prevalence of clinical manifestation in ECG**

Clinical Manifestation	ECG abnormalities in number patients (40)	Percentage %
Persistent vomiting	9	22.5 %
Abdominal pain	11	27.5 %
Mucosal bleed	5	12.5 %
Fluid accumulate	7	17.5 %
Restlessness	6	15 %
Hepatomegaly >2 cm	2	5 %
Shock	8	20 %
Respiratory distress	4	10 %
ARDS	5	12.5 %

Table – 3
Prevalence of clinical manifestation in ECG



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