



Original Research Article

The study of cardiac manifestations in patients with dengue infection and correlation of cardiac manifestations to warning signs of dengue

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Abstract

Background: World Health Organization estimates that 50-100 million dengue infections occur every year with 22000 deaths. The increasing magnitude of the problem together with its changing epidemiology is an important public health concern. The aim of this study was to observe the presence of Electrocardiographic changes in patients of dengue infection and to evaluate whether there were any related clinical cardiac manifestations and correlation of cardiac manifestations to warning signs of dengue.

Methods: This study was conducted at tertiary care institute in department of medicine. Data obtained from 74 patients over the period of one year fulfilling inclusion criteria were studied.

Results: 16 patients had no warning signs, 58 patients had warning signs, out of which 39 patients had two or more warning signs, while 19 patients had single warning sign. Most common warning sign in this study was abdominal pain and Vomiting while Hepatomegaly was the least common warning sign. The most common cardiac abnormalities noted were rhythm abnormalities of which the commonest was sinus bradycardia, found in around 56% of the patients. There was statistically significant correlation between cardiac manifestations and all the warning signs except lethargy/restlessness and Hepatomegaly.

Conclusions: The most common cardiac manifestations noted were transient rhythm abnormalities, of which sinus bradycardia was the commonest. There was statistically significant correlation between cardiac manifestations and all the warning signs except lethargy/restlessness and hepatomegaly.

Keywords: Electrocardiography, dengue infection, cardiac manifestations.

Introduction

Dengue is the common mosquito borne endemioepidemic arboviral infection in many of the tropical and subtropical regions of the world. About 50 million dengue infections occur annually and approximately 2.5 billion people live

in dengue endemic countries.¹ India have recorded increasing incidence of dengue infections in recent years. Dengue infection was first reported in India from Chennai in 1780. Today dengue viral infection is documented in almost all parts of India. During 1996, one of the most severe

outbreaks of DF/DHF occurred in Delhi, with 10,252 cases and 423 deaths being reported (country total being 16,517 cases and 545 deaths). In 2006, the country witnessed an outbreak of DF/DHF with 12,317 cases and 184 deaths. The incidence of dengue is increasing in the last few years. During 2010, a total of 28,292 cases were reported, which increased to 50 222 in 2012 and 75 808 in 2013 – the highest since 1991.^{2,3} The case fatality ratio (CFR – deaths per 100 cases) has declined from 3.3% in 1996 to 0.4% in 2010 after the national guidelines on clinical management of DF/DHF/dengue shock syndrome (DSS) were developed and circulated in 2007.⁴ This further declined to 0.3% in 2013.

Dengue is transmitted by the mosquitoes *Aedes aegypti* and *Aedes albopictus*, which are found throughout the world. Symptoms of infection usually begin 4 - 7 days after the mosquito bite and typically last 3 - 10 days.^{5,6} Dengue virus belong to genus *Flavivirus* and family *flaviviridae* and dengue is caused by any one of the four serologically related viruses, designated as DEN-1, DEN2, DEN-3 and DEN-4.⁷

Classical dengue fever is seen 4 - 6 days after an infective mosquito bite, with sudden onset of fever (biphasic often), severe headache, chills, generalized pains in muscles and joints, often is associated with maculopapular rash. There is leucopenia, relative lymphocytosis, thrombocytopenia and haemorrhagic manifestations may occur.⁸ Severe dengue infections may give rise to many complications such as liver failure, disseminated intravascular coagulation, encephalopathy, myocarditis, acute renal failure, and haemolytic uremic syndrome. Although these complications are generally rare, in recent years they have been reported with increasing frequency. Cardiac manifestations in dengue virus infection can range from asymptomatic bradycardia to life threatening myocarditis.⁹ Various studies have quoted several cardiac manifestations of dengue infection like sinus bradycardia, transient AV blocks, transient

ventricular arrhythmias, myocarditis and pericardial effusion.^{10,11}

The aim of this study was to observe the presence of Electrocardiographic changes in patients of dengue infection and to evaluate whether there were any related clinical cardiac manifestations and correlation of cardiac manifestations to warning signs of dengue.

Material and Methods

This was a prospective study, conducted at tertiary care institute in department of medicine over the period of one year. In this duration 160 patients admitted with suspected dengue fever were selected for the study. Out of them, 74 ELISA confirmed IgM dengue sero-positive cases were satisfying WHO criteria.¹²

Inclusion criteria

- Fulfilling the WHO criteria for dengue.
- Age group of ≥ 15 years.
- ELISA confirmed IgM dengue sero-positive cases.

Exclusion criteria

- Patients with history of pre-existing heart disease.
- Patients with electrolyte abnormalities.
- Patients on medications affecting the heart rate / rhythm.

Observation and Result

Table 1: Baseline clinical characteristics of dengue patients

Character	Number of patient
Sex	
Male	46
Female	28
Age range(years)	
15-30	14
31-45	31
46-60	18
>60	11

A total of 74 patients admitted to our hospital with fever and IgM dengue positive status fulfilling inclusion criteria were included. Out of which 46 were males and 28 females.

Mean age was 39.3 ± 12 years, a youngest patient was 16 years and oldest was 66 years old.. No patient died in present study.

Table 2: Warning signs of dengue

Warning signs	Number of patients
Persistent vomiting	32
Abdominal pain	37
Mucosal bleed	13
Lethargy	22
Hepatomegaly	08
Shock	01
Respiratory distress	04

Fever was present in all patients. Other clinical manifestations include abdominal pain 50%, persistent vomiting 43%, petachial haemorrhage 5%, Hepatomegaly 8%, shock 1%, respiratory distress 5%. Minimum platelet count in this study was 12000/cmm, while mean platelet count in this study was 21435.42/cmm. Severe hepatic derangement (SGPT >1000) was not detected in this study, highest SGOT/SGPT was 345/436 in this study.

Warning signs and symptoms includes respiratory distress, oxygen, severe abdominal pain, excessive vomiting, altered sensorium, confusion, convulsions, rapid and thready pulse, narrowing of pulse pressure less than 20 mmHg, urine output less than 30ml/hour, laboratory evidence of thrombocytopenia/ coagulopathy, metabolic acidosis, derangement of liver/renal function tests.

Table 3: Electrocardiographic (ECG) changes in dengue patients

ECG changes	Number of patients
Sinus rhythm	09
Sinus tachycardia	06
Sinus bradycardia	44
First degree heart block	05
Ventricular ectopics	11

Table 3 shows ECG changes in dengue patients in our study. Sinus bradycardia was the most common ECG finding in present study while first degree heart block was least common.

Table 4: Correlation of warning signs to ECG abnormality

Warning signs	ECG abnormality	
	Yes	No
Persistent vomiting	19	13
Mucosal bleed	10	03
Abdominal pain	29	08
Lethargy	11	11
Hepatomegaly	03	04
Shock	01	00
Respiratory distress	03	01

Table 4 shows the correlation between warning signs and ECG changes in dengue patients. There was statistically significant correlation between ECG abnormalities and abdominal pain and mucosal bleed.

Discussion

Increase in the number of dengue cases over the past few years has been attributed to rapid unplanned urbanization with unchecked construction activities and poor sanitation facilities contributing fertile breeding areas for mosquitoes, it is also seen that increase in alertness among medical personnel following the epidemics and availability of diagnostic tools in the hospitals have contributed to the increased detection of cases.¹³ Fever was the most common presentation (100%), which is in unison with other similar studies from India and South-East Asia.¹⁴ Headache and myalgia were seen in majority of cases. Similar result were found by Kumar S et al in their study.¹⁵

Mean age group of present study is 29.3 years youngest was 18 years and oldest was 50 years and age group that is mostly affected in other studies like Neeraja M¹⁶ in Hyderabad was 20 -39 years.

Most common warning sign in this study was abdominal pain (50%) and Vomiting (43%). In the study by Thien et al¹⁷ with dengue patients fever and persistent vomiting was noted in 39% of cases and was most common warning sign. Kumar S et al in their study¹⁵ found similar results.

In this study cases showed sinus braycardia in 59%and ventricular ectopics in 15% cases and sinus tachycardia in 13%cases. While in other

studies Gupta V et al showed 18% Brady cardia, 64% relative bradycardia, and 14% sinus tachycardia.¹⁸

Conclusion

Most common electrocardiographic change in dengue viral fever patient was sinus bradycardia, which resolved spontaneously over period of 36 to 48 hours. Sinus rhythm, First degree heart block and ventricular ectopic were other ECG manifestation in these patients. There was no evidence of myocarditis in any of the patients. In present study ECG abnormalities were common but all the ECG changes were reversible and no patient died in our study. There was statistically significant correlation between warning signs and ECG changes in dengue patients.

Funding: None

Conflict of interest: None

Ethical approval: taken from institutional ethical committee.

References

1. WHO. Dengue and dengue haemorrhagic fever. Geneva, World Health Organization. 2008.
2. Baruah K, Biswas A, Suneesh K, Dhariwal AC. Dengue fever: Epidemiology and clinical pathogenesis. Chapter 13, Major tropical diseases: Public health perspective. Goa: Broadway publishing House. 2014:255-71.
3. Dutta AK, Biswas A, Baruah K, Dhariwal AC. National guidelines for diagnosis and management of dengue fever/dengue hemorrhagic fever and dengue shock syndrome. J Ind Med Assn. 2011;109(1):30-5.
4. World Health Organization. Comprehensive guidelines for prevention and control of dengue and dengue hemorrhagic fever. New Delhi: WHO, SEARO; 2011: revised and expanded edition.
5. Khoj L, Baksh R, Aslam M, Kelta M, Albeirouti B, Rehman JU. A case of dengue fever-induced severe aplastic anemia salvaged by allogenic bone marrow transplant. J Leuk. 2013;1:1-3.
6. Pruthvi D, Shashikala P, Shenoy V. Evaluation of platelet count in dengue fever along with seasonal variation of dengue infection. J Blood Disord Transf. 2012;3:128.
7. Alcon S, Talarmin A, Debruyne M, Falconar A, Deubel V, Flamand M. Enzyme-linked immunosorbent assay specific to dengue virus type 1 non-structural protein ns1 reveals circulation of the antigen in the blood during the acute phase of disease in patients experiencing primary or secondary infections. J Clin Microbiol. 2002;40(2):376-81.
8. Topley WWC, Wilson SGS. Topley and Wilson Microbiology and Microbial infections, 10th Edition. 2006;993-1009.
9. Wiwanikit. Dengue Cardiac Infection, A Brief Review; Acta Cardiol Sin. 2008;24:226.
10. Wichmann D, Kularatne S, Ehrhardt S, Wijesinghe S, Brattig NW, Abel W, et al. Cardiac involvement in dengue virus infections during the 2004/2005 dengue fever season in Sri Lanka: Southeast Asian J Trop Med Public Health. 2009;40:727-30.
11. Sheetal S, Jacob E. A Study on the Cardiac Manifestations of Dengue. JAPI. 2016; 64:30-5.
12. Yadav RK, Kumar S. To study cardiac manifestations in patients presenting with dengue infection and to find out the correlation of cardiac manifestations to warning signs of dengue. Int J Adv Med 2017;4:323-8.
13. Gubler DJ. Dengue and dengue hemorrhagic fever. Clin Microbiol Rev. 1998;11:480-96.

14. Munde DD, Shetkar UB. Clinical features and Hematological Profile of Dengue Fever. Indian J Appl Res. 2013;3:131-2.
15. Kumar S, Suman S, Ranjan R. A clinical and biochemical study of dengue fever in Kosi region of Bihar, India. Int J Adv Med 2017;4:964-7.
16. Neeraja M, Lakshmi V, Teja VD, Umabala P, Subbalakshmi MV. Serodiagnosis of dengue virus infection in patients presenting to a tertiary care hospital. Indian J Med Microbiol. 2006;24(4):280-2.
17. Thein S, Aung MM, Shwe TN, Aye M, Zaw A, Aye K, et al. Risk factors in dengue shock syndrome. Am J Trop Med Hyg. 1997;56:566-72.
18. Vishal Kumar Gupta, AK Gadpayle. Subclinical Cardiac Involvement in Dengue Hemorrhagic Fever. JIACM. 2010;11(2):107-11.