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Research Article

CARDIAC EVALUATION IN PATIENTS OF DENGUE FEVER OF CENTRAL INDIA

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ABSTRACT

Introduction: Dengue rarely affects the heart but clinical symptoms of cardiac involvement may range greatly from silent illness to severe myocarditis resulting in death. Clinical features are asymptomatic and most are transient among patients with DF/DHF.

Material and methods: It was an observational study conducted at the Department of General Medicine, Sri Aurobindo Medical College & PG Institute Indore. All dengue patients presenting to SAIMS Hospital during one and half years from which data was collected using as per given proforma.

Results: In the present study group of 51 patients, it was found that 49 patients (84.5%) have not shown any cardiac abnormalities and 9 patients have abnormal values (15.5%) but are not significant. It is also found that the incidence of cardiac manifestations was more common in DHF and dengue shock syndrome which was 15.5% and 3.4%, respectively.

Conclusion: Clinical manifestations of cardiac involvement can vary widely from silent disease to severe myocarditis resulting in death. Rhythm abnormalities, hypotension, arrhythmias, myocarditis, myocardial depression with symptoms of heart failure and shock, and pericarditis have been reported. Involvement of multiple organs, as well as the presence of metabolic derangement, can further confuse the picture.

INTRODUCTION

Dengue rarely affects the heart but clinical symptoms of cardiac involvement may range greatly from silent illness to severe myocarditis resulting in death. Clinical features are asymptomatic and most are transient among patients with DF/DHF.

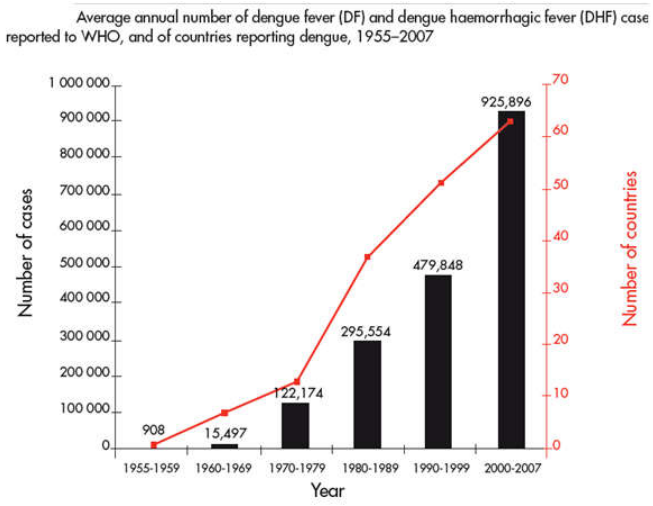

Figure 1 Trend of Global Incidence of Dengue

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Dengue is the most rapidly spreading mosquito-borne viral disease in the world. In the last 50 years, incidence has increased 30-fold with increasing geographic expansion to new countries. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries.[1]

The dengue viruses are the members of the genus Flaviviridae. These small (50nm) viruses contain single stranded RNA. There are four virus serotypes, which are designated as DEN-1, DEN-2, DEN-3 and DEN-4. Although all four serotypes are share antigenicity, they are different enough to elicit cross-protection only for a few months after infection by any one of them. Infection with any one serotype confers lifelong immunity to the virus serotype. Man and mosquitoes are reservoirs of infection. At present DEN-1 and DEN-2 serotypes are widespread in India[2]. Dengue viruses are transmitted by the bite of female Aedes Aegypti mosquitoes but other species such as Aedes albopictus, Aedes polynesiensis and Aedes niveus have also been culprits as secondary vector It is well known that, dengue affects the heart. Isolated cases of conduction disorders, supraventricular arrhythmias and myocarditis have been reported in past. Also, the ventricular dysfunction associated with the acute phase of dengue haemorrhagic fever has been described by several authors and is probably under diagnosed in clinical practice. Although cardiac manifestations specific to dengue are rare,

depression of myocardial function is frequent in the haemorrhagic form of the disease or in the associated shock[3]. CPK-MB is used as a biochemical evidence of cardiac involvement and ECG and 2D- Echo are tools used to access electro-physiological evidence of cardiac involvement.

Aim

The incidence of Cardiac Manifestations in Dengue Fever.
The outcome of patient of Dengue fever with Cardiac Involvement.

MATERIAL AND METHODS

The study was conducted at department of Medicine in a tertiary care hospital Sample size-100 cases of Dengue Fever was under study group. But we managed to get 8 more cases making final sample size 108 (N = 108). Study duration: 18 months.

Inclusion Criteria-Any patient admitted with acute febrile illness having IgM Dengue ELISA Positive.

Exclusion Criteria-Age less than 12 years. All patients treated on out-patient basis. Patients sustained a recent myocardial infarction.

Selection of Cases-Any patient admitted in wards of ICU having acute febrile illness and IgM

Dengue ELISA Positive were enrolled in study after their consent.

Clinical History-A thorough enquiry of presenting symptoms with special reference to fever, rash and bleeding manifestations was documented in details. Other symptoms history was also evaluated in detail.

Clinical Examination-In detail clinical examination including general examination and systemic examination was done in broad day-light after due consent of patients as per standard format for same. Laboratory Tests: All enrolled patients were subjected to Complete Blood Count (CBC) including platelet count, renal function tests (Urea, creatinine and electrolytes) and Liver Function Tests (bilirubin, ALP,SGPT,SGOT and Serum Proteins). Tests for Cardiac Evaluation: As a biochemical evidence of cardiac involvement, CPK-MB was done of all enrolled patients. Also, all enrolled patients were subjected to ECG on admission.

RESULT

In our study of 108 Dengue patients, the age of varied from 13 years (minimum) to 75 years (maximum) with mean age of 33.4 years. The most common affected age group was young population from 21 to 30 years having 35 patients (32.4% cases). There were 25 patients (23.1%) of younger than 20 years age being second most common affected age group.

Table 1 Age and Gender Distribution

Age group	Gender		Total
	Male	Female	
≤ 20	17	8	25
21 – 30	21	14	35
31 – 40	9	10	19
41 – 50	4	5	9
51 – 60	5	5	10
> 60	4	6	10
Total	60	48	108

Age group between 31 to 40 years had 19 patients (17.6%), 41 to 50 years had 9 patients (8.3%) whereas 51 to 60 years and above 60 years had 10 patients(9.3%) each. In our study of 108 patients, males [60 patients (55.6%)] were more commonly affected than females [48 patients (44.4 %)]

Majority of our patients were students or unemployed. Out of 108 patients, 35 were unskilled workers (32.4%), 34 were students (31.5%), 29 were housewives (26.9%), 9 were retired senior citizens (8.3%) and 1 was inmate of mental hospital (0.9%).

Table 2 Occupation

Occupation	Number of patients	Percentage (%)
Housewife	29	26.9
Unemployed	9	8.3
Student	34	31.5
Unskilled worker	35	32.4
Mental hospital inmate	1	0.9
Total	108	100.0

Presenting complains: In our study of 108 patients, 107 patients (99.1%) presented with fever and it was the most common presenting symptom. Headache was next common affecting 70 patients (64.8%) followed by myalgia in 61 patients (56.5%) patients. Other complains include bleeding manifestations 10 cases (9.25%) in form of per-rectal bleed, per vaginal bleed, petechial haemorrhages or ecchymosis, malena, gum bleeding and few cases of intra-cranial haemorrhage as well. Other non-bleeding manifestations included joint pain 10 cases (9.25 %), nausea and vomiting 10 cases (9.25%), abdominal pain in 7 cases (6.48 %), altered sensorium 7 cases (6.48%), breathlessness in 6 cases (5.55%), limb weakness in 5 cases (4.62%) and GTCS in 1 case.

Table 3 Presenting complaints.

Complaints	Number of patients	Percentage (%)
Fever	107	99.1
Retro-orbital Headache	70	64.8
Mylagia	61	56.5
Conjunctival Congestion	9	8.3
Rash	49	45.4
Bleeding Manifestations	10	9.25
Vomiting	10	9.25
Joint pain	10	9.25
Abdominal Pain	7	6.48
Altered sensorium	7	6.48
Breathlessness	6	5.55
Limb weakness	5	4.62
Convulsion (GTCS)	1	0.92

Systemic examination: In our study of 108 patients, 3 patients (2.7%) had abnormal cardiovascular system examination in form of loud second heart sound (P2) in 2 patients and one had mid- diastolic murmur of mitral stenosis that was a diagnosed case of rheumatic mitral stenosis. Abnormal respiratory system examination was present in 12 patients (11.1%) in the form of bilateral coarse crackles. Neurological examination was abnormal in 17 patients (15.7%) of which 5 patients had flaccid quadriparesis 4 of them were diagnosed to have Guillain-Barre Syndrome while 1 patient had hypokalemic paralysis. 1 patient had left sided hemiparesis and 11 patient had altered mental status. Clinically abnormal per-abdominal system examination was present in 7 patients (6.5%) having ascites and splenomegaly.

Table 4 Systemic Examination.

Systemic Examination	Number of patients with abnormal finding	Percentage (%)
CVS	3	2.7
RS	12	11.1
CNS	17	15.7
PA	7	6.5

In our study, 13 patients (12.04%) had platelet count less than 20000, 44 (40.74%) had counts between 20001 to 50000, 25(23.15%) had platelet count 50001 to 100000 and 26 (24.07%) had platelet count more than 100000.

Table 5 Degree of thrombocytopenia.

Platelet Count	Number of patients	Percentage (%)
≤ 20000	13	12.04
20001 - 50000	44	40.74
50001 - 100000	25	23.15
> 100000	26	24.07
Total	108	100

Malaria and Chikungunya Co-infection: In our study of 108 dengue patients, 2(1.9%) were co- infected with malaria and 7 (6.5%) were co-infected with chikungunya virus.

Table 6 Co- Infections.

Co-infection	Positive		Negative		Equivocal	
	Number of patients	Percentage (%)	Number of patients	Percentage (%)	Number of patients	Percentage (%)
Malaria Antigen	2	1.9	106	98.1	0	0.0
Chikungunia IgM	7	6.5	97	89.8	5	4.6

Dengue Classification-Previously, Dengue was classified according to increasing severity as Dengue Fever (DF), Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). In our study, 81 out of 108 cases (75%) were of Dengue Fever (DF), 10 cases (9.3 %) were of Dengue Haemorrhagic fever (DHF) and 17 cases (15.7%) were of Dengue Shock Syndrome (DSS). But, according to new classification by WHO in 2009 (1), now dengue is classified as Dengue without warning signs, Dengue with Warning Signs and Severe Dengue. In our study, 54 out of 108 cases (50%) had Dengue without warning signs, 28 cases (25.9%) had Warning signs and 26 (24.1%) had Severe Dengue.

Table 7 New Classification of Dengue.

New Classification	Number of patients	Percentage (%)
Dengue without warning sign	54	50
Dengue with warning signs	28	25.9
Severe Dengue	26	24.1
Total	108	100.0

Cardiac involvement in Dengue CPK-MB: In our study of 108 patients, 45 patients (41.7%) had raised CPK-MB signifying some sort of myocardial injury.

Table 8 CPK-MB

CPK-MB	Number of patient	Percentage (%)
Normal	63	58.3
Abnormal(High)	45	41.7
Total	108	100.0

Echocardiography (2D-echo): In our study, Echocardiography (2D Echo) was abnormal in 10 cases of which, 6 cases (5.56%) had pericardial effusion, 3 had pulmonary hypertension and 1 (0.93) had global LV hypokinesia.

Table 9 2D-Echo.

2D Echo Findings	Number of patients	Percentage (%)
Normal	98	90.74
Abnormal	10	9.26
Total	108	100.00

Cardiac Involvement with demographics: When compared among various age groups, no significant association between age of patient and cardiac involvement (p value 0.905, p-value<0.05 are significant, Fisher's exact test used).

Table 10 Age vs Cardiac Involvement.

Age group	Cardiac involvement		Total	p-value
	Yes	No		
≤ 20	16	9	25	0.905
21 – 30	18	17	35	
31 – 40	9	10	19	
41 – 50	5	4	9	
51 – 60	5	5	10	
> 60	5	5	10	
Total	58	50	108	

On similar lines, 21 of 54 cases of Dengue without warning signs had cardiac involvement, 16 out of 28 cases of Dengue with warning signs had cardiac involvement and 21 cases of severe dengue had cardiac involvement. By using Chi-square test there is statistically significant co-relation between severity of dengue as new criteria and cardiac outcome (p-value 0.002, p-value < 0.05 is considered significant, Chi-square test used).

Table 11 Cardiac involvement vs New classification of Dengue.

New criteria	Cardiac involvement		Total	p-value
	Yes	No		
Dengue without warning signs	21	33	54	0.002
Dengue with warning signs	16	12	28	
Severe Dengue	21	5	26	
Total	58	50	108	

In our study of 108 patients, 9 patients succumbed to the illness and 8 of them had cardiac involvement which is statistically significant (p-value 0.036, p-value < 0.05 are significant, Fisher exact test used).

Table 12 Cardiac involvement vs Outcome.

Outcome	Cardiac involvement		Total	p-value
	Yes	No		
Survive	50	49	99	0.036
Death	8	1	9	
Total	58	50	108	

DISCUSSION

In our study of 108 Dengue patients, the age of varied from 13 years (minimum) to 75 years (maximum) with mean age of 33.4 years. The most common affected age group was young population from 21 to 30 years having 32.4% cases.[4] in their study found mean age to be 30.8 years. [5] also found that commonest age group to be affected in dengue to be 21 to 30 years.6 also found that most common age group to be 15-40 years. In our study, males were (55.6%) were more commonly affected than females (44.4 %) with ratio of 1.25:1.[5] found sex ratio in dengue to be 1.14:1, whereas according to[6] , 56 % were male and 44% were female. Greater propensity among males is attributable to greater exposure of aedes mosquitoes to males because Aedes are usually residing in artificially

collected waters at outdoor sites. In our study, 60.2% were residing in urban area whereas remaining 39.8% lived in rural areas. Out of 108 patients, 32.4% were unskilled workers, 31.5% were students and 26.9% were housewives. The trend of incidence of dengue was shifting from to urban areas due to large scale development activities, industrialization, urbanization causing lack of adequate water supply and electric supply resulting into traditional water storage practices in community, failure in dry day once in week, refusal for emptying the containers, improper cleaning of cement containers, uncovered storage water, and less social involvement in health education.

In our study of 108 patients, 99.1% cases presented with fever and it was the most common presenting symptom. Headache was next common affecting 64.8% cases followed by myalgia in 56.5% patients. Bleeding manifestations was present in 9.25% cases in form of per-rectal bleed, per vaginal bleed, petechial haemorrhages or ecchymosis, malena , gum bleeding and few cases of intra-cranial haemorrhage as well.[6] (100%) and [5] (96.2%) also found fever to be most common presenting feature. Headache and bodyache as next common manifestation was also found by[6] (90%) and [5] (57%). Classical blanching rash described in dengue was present in 43.5% cases while 8.3% patients had conjunctival congestion.

In our study of 108 dengue patients, 1.9% were co-infected with malaria and 6.5% were co- infected with chikungunya virus. Few cases of Dengue and Malaria co-infection are also reported by[7] and [8]. Similarly case reports of Dengue and Chikungunya co- infection are reported by9.

In our study, 75% were of Dengue Fever, 9.3 % were of Dengue Haemorrhagic fever (DHF) and 15.7% cases were of Dengue Shock Syndrome (DSS). In a similar study by[10], they found 67% cases of Dengue Fever, 32 % cases of Dengue Haemorrhagic fever and 1% cases of Dengue Shock Syndrome. In contrast[3] found 70.83% cases of Dengue Haemorrhagic Fever, 16.67 cases of Dengue Fever and 12.5% cases of Dengue shock syndrome. When newer classification as described by WHO in 2009 is considered, 50% patient had Dengue without warning signs, 25.9% patients had Warning signs and 24.1% had Severe Dengue. In a study by [11], they found 36% cases of Dengue without warning signs, while 64% patients had Dengue with warning signs. In a study,[12] found 12.7% cases having Severe Dengue. This signifies that most patients of Dengue have milder form of illness.

2D Echo was abnormal in 9.25% cases of which, 5.56% cases had pericardial effusion, 2.7% had pulmonary hypertension and 0.9% had global LV hypokinesia. In a similar study,[13] did not find any case having global LV hypokinesia.[10] found 2% cases with wall motion abnormalities, 1% had depressed ejection fraction and 1 % had pericardial effusion. No case of Takotsubo cardiomyopathy was found. In our study of 108 patients, 9 patients succumbed to the illness and 88.8% of them had cardiac involvement which is statistically significant (p-value 0.036). Also, in our study, there was significant co-relation between abnormal ECG (p-value 0.011) and 2D-echo findings (p-value 0.004) with outcome but no such association was found with CPK-MB levels. This denotes that mortality is high among patients having cardiac involvement.

CONCLUSION

The incidence of Cardiac involvement in Dengue fever is 53.70% probability of Cardiac involvement is high in patients with thrombocytopenia probability of cardiac involvement rises as thrombocytopenia worsens probability of cardiac involvement rises as severity of dengue increases probability of 2D-Echo abnormality rises with finding an abnormal ECG mortality is high among patients having cardiac involvement probability of elevated CPK-MB levels rises as severity of dengue increases probability of 2D-Echo abnormalities rises as severity of dengue increases probability of elevated CPK-MB levels rises as thrombocytopenia worsens. Clinical manifestations of cardiac involvement can vary widely from silent disease to severe myocarditis resulting in death. Rhythm abnormalities, hypotension, arrhythmias, myocarditis, myocardial depression with symptoms of heart failure and shock, and pericarditis have been reported. Involvement of multiple organs, as well as the presence of metabolic derangement, can further confuse the picture.

Reference

1. WHO. Dengue Guidelines. 2009.
2. NVBDCP. Guidelines for Clinical Management of DF, DHF and DSS. 2008.
3. Arora M, Patil RS. Cardiac Manifestation in Dengue Fever Vol. 64, *Journal of The Association of Physicians of India* 2016 [cited 2018 Nov 25].
4. Mallhi TH, Khan AH, Adnan AS, Sarriff A, Khan YH, Jummaat F. Clinico-laboratory spectrum of dengue viral infection and risk factors associated with dengue hemorrhagic fever: A retrospective study. BMC Infect Dis. 2015.
5. Krishna G. A Study of Clinical and Epidemiological Profile of Dengue Fever in Tertiary Care Centre in Central India. *J Med Sci. Clin. Res*.2017 Jun 12.
6. Ashinkunti MD, Dhananjaya M. A Study of Clinical Profile of Dengue Fever in a Tertiary Care Teaching Hospital. *Sch J Appl Med Sci*. 2013;1(4):280–2.
7. Kaushik RM, Varma A, Kaushik R, Gaur KJBS. Concurrent dengue and malaria due to Plasmodium falciparum and P. vivax. Trans R Soc Trop Med Hyg. 2007.
8. Hati AK, Bhattacharjee I, Mukherjee H, Bandyopadhayay B, Bandyopadhyay D, De R, *et al*. Concurrent dengue and malaria in an area in Kolkata. *Asian Pac J Trop Med*. 2012.
9. Parreira R, Centeno-Lima S, Lopes A, Portugal-Calisto D, Constantino A, Nina J. Dengue virus serotype 4 and Chikungunya virus co-infection in a traveller returning from Luanda, Angola, January 2014. Euro surveillance. 2014.
10. Miranda CH, Borges MDC, Matsuno AK, Vilar FC, Gali LG, Volpe GJ, *et al*. Evaluation of cardiac involvement during dengue viral infection. Clin Infect Dis. 2013.
11. 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 [Internet]*. 2017;4 (2):323.
12. Kirawittaya T, Yoon I, Wichit S, Green S. Evaluation of Cardiac Involvement in Children with Dengue by Serial Echocardiographic Studies. PLoS Negl Trop Dis. 2015;1–17.
13. Gupta VK, Gadpayle AK. Subclinical Cardiac Involvement in Dengue Haemorrhagic Fever. *Journal, Indian Acad Clin Med*. 2010;11(2):107–11