

**STUDY OF BRADYCARDIA IN DENGUE FEVER**

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**ABSTRACT: BACKGROUND AND OBJECTIVES:** All the four serotypes of dengue virus are found in our country. Case fatality rates in endemic countries like India are 2.5%. During epidemics of dengue, attack rates among susceptible are 40-90%. Early recognition and prompt treatment are vital if disease related morbidity and mortality are to be limited. Clinical features that can be used in the initial assessment of febrile patients are essential tools for clinicians, especially in limited resource settings. Awareness of bradycardia as a clinical finding, could help in the early recognition of dengue and potentially reduce complications and death. **METHOD AND RESULTS:** The study was conducted in the Department of Medicine, Mysore Medical College & Research Institute, Mysore from the period of July 2010 to December 2010 who met the inclusion and exclusion criteria. A total of 100 patients of Dengue fever were analyzed. The most common age group affected in our study was 20-39 years (53%). The clinical spectrum of cases included 22% cases of Dengue fever (DF), 72% cases of Dengue Hemorrhagic fever (DHF), 6% cases of Dengue Shock Syndrome (DSS). Clinical pulse rate distribution amongst cases showed 27% with bradycardia, 61% with relative bradycardia, and 12% with tachycardia. Electrocardiographic changes in our study showed 37% with sinus bradycardia, 48% with normal sinus rhythm, 1% with first degree heart block, and 14% with sinus tachycardia. **CONCLUSION:** Bradycardia was a predominant occurrence amongst total of 100 cases of Dengue fever analyzed. 88% of the cases had bradycardia. (61% had relative bradycardia and 27% bradycardia. Majority of the patients on ECG showed sinus bradycardia (37%) and normal sinus rhythm (48%). Hence, awareness of bradycardia as a clinical finding, can help in the early recognition of dengue and potentially reduce complications and death associated with dengue virus infection.

**KEYWORDS:** Bradycardia, dengue fever.

**INTRODUCTION:** The dengue virus is an arthropod borne virus Arbovirus, belonging to the family Flaviviridae and genus Flavivirus. It is a mosquito borne viral infection and is transmitted, primarily by *Aedes aegypti* and sometimes by *Aedes albopictus*.

Dengue is caused by four distinct serotypes of viruses; DEN-1, DEN-2, DEN-3 and DEN-4. Dengue virus causes a spectrum of illness ranging from a clinically in-apparent, self-limiting classical dengue fever (DF) to life threatening dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). Dengue is characterized by increased vascular permeability, hypovolemia and abnormal clotting mechanisms.<sup>1</sup>

It is one of the most common arboviral infections which infect man. It is the second most important mosquito borne infection in terms of morbidity, mortality and economic costs. Dengue fever is one of the most important emerging diseases of tropical and subtropical regions. Disease is predominant in urban and suburban areas and now in rural areas also. Around 2.5-3 billion people

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live in areas where dengue virus can be transmitted. Each year approximately 50 million infections occur, with five lakh cases of DHF and at least 12,000 deaths, mainly among children.

From being a sporadic illness, epidemics of dengue have become a common occurrence worldwide. Dengue fever and dengue hemorrhagic fever is endemic in certain areas of South East Asia like Bangladesh, India, Indonesia, Maldives, Myanmar, Sri Lanka and Thailand. Dengue is a major cause of hospitalization and death, especially among children in these regions.

India is endemic for DF and DHF. All the four serotypes are found in the country. Case fatality rates in endemic countries are 2.5%. During epidemics of dengue, attack rates among susceptible are 40-90%. Early recognition and prompt treatment are vital if disease related morbidity and mortality are to be limited.<sup>2</sup>

The incidence of dengue and global distribution of dengue have greatly increased in recent years. An increased disease burden has been linked to the resurgence of mosquito vector *Aedes aegypti*, overcrowding, urbanization and increasing travel. Despite its significant health and economic impacts, as of yet there is no specific treatment or therapy for dengue infection and the outcome depends on medical care provided by the doctor to the patient.

**OBJECTIVES OF THE STUDY:** To study the incidence of bradycardia and ECG rhythm changes in Dengue fever.

**BACKGROUND FOR THE STUDY:** The name dengue is derived from the Swahili word 'ki denga pepo' which means 'sudden seizure by the demon'. The term 'break bone fever' was coined following the Philadelphia epidemic in 1780. The earliest description of dengue fever was made in the same year by Benjamin Rush.<sup>3</sup> The other names for dengue fever are dandy fever, denga, dunga fever and coup-d-barre. Humans and mosquitoes are the principal hosts of dengue virus; the mosquito remains infected for life but the viruses are only known to cause illness in humans.<sup>4</sup>

The ability of the mosquito *Aedes aegypti* to transmit the disease was demonstrated in the year 1903. The viral etiology was demonstrated in the year 1906. Sabin in 1944 established the existence of the dengue viral serotypes. Dengue serotype 1 was isolated from Hawaii in 1944, serotype 2 from New Guinea in 1944 and serotype 3 and 4 from Philippines in 1956.

Following the description of disease in 1780, epidemics were noted constantly throughout the world. Epidemics were common in the temperate areas of the America, Europe, Australia, and Asia until the early 20<sup>th</sup> century. Dengue fever and dengue like illness are now endemic in tropical Asia, the South Pacific islands, Northern Australia, tropical Africa, the Caribbean, Central and South America. Dengue hemorrhagic fever was first noted in Thailand and Philippines in the 1950s. It was also called as the 'Thai or Philippine hemorrhagic fever.

The term dengue shock syndrome was coined to describe the cases of DHF with shock. It is caused due to increased vascular permeability and intravascular hyovolemia.<sup>5</sup>

The first major epidemic illness clinically compatible with dengue in India was reported from Madras (Chennai) in 1780, which later spread all over the country. Later, an outbreak of dengue like illness was reported in 1956 from Vellore, Tamil Nadu and since then, it has persisted in various parts of the country.<sup>6</sup> The first major outbreak of dengue hemorrhagic fever was reported from Calcutta (Kolkata) in 1964. This was followed by an epidemic in Vishakhapatnam in 1965.

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India comes under category B of the classification meant for SEAR. Here DHF is an emerging disease, cyclical epidemics are frequent and multiple virus serotypes exist. *Aedes aegypti* is the primary vector. All the four serotype presently exist in the country. The first major epidemic illness compatible clinically with dengue occurred in Madras (Chennai) in 1780. This, later, spread all over the country.

Relative bradycardia has been reported in many infectious diseases, including typhoid fever, Legionnaires' disease, psittacosis, typhus, leptospirosis, malaria, and babesiosis. Relative bradycardia is a notable clinical feature of Dengue fever. Relative bradycardia was first reported from Singapore in 2005. Prior to that, the association of this sign with Dengue fever was not known.

Dengue fever is a potentially fatal illness; >2.5 billion persons are at risk and the disease is endemic in almost 100 countries. No specific clinical features distinguish dengue from other febrile illnesses; thus, diagnosis relies heavily on results of laboratory investigations. Virus-specific immunoglobulin M (IgM) antibodies only become detectable after 5–7 days, and false-positive results can confound the diagnosis.

Clinical features that can be used in the initial assessment of febrile patients are essential tools for clinicians, especially in limited resource settings. Awareness of bradycardia as a clinical finding, could help in the early recognition of Dengue and potentially reduce complications and death associated with dengue virus infection.<sup>7</sup>

Studies relating bradycardia with Dengue fever in our country are scarce. Hence, this study was taken up to observe the pattern of heart rate and electrocardiographic changes associated with Dengue fever.

**METHODOLOGY:** The study was conducted in the Department of Medicine, Mysore Medical College & Research Institute, Mysore from the period of July 2010 to December 2010. Patients enrolled in the study were from the K. R. Hospital, Mysore, attached to Mysore Medical College & Research Institute, Mysore.

### **Inclusion Criteria:**

- A. All patients coming with history of fever with one or more of the following symptoms (1) vomiting, (2) joint pain, (3) diarrhea, (4) abdominal pain, (5) headache, amongst others.
- B. All patients with Dengue IgM/NS<sub>1</sub> Ag positive.

### **Exclusion Criteria:**

All patients with fever who are Dengue IgM/NS<sub>1</sub> Ag negative.

All patients included in the study were examined for

1. Pulse/Heart rate
2. Blood Pressure
3. Respiratory rate
4. Temperature
5. JVP
6. Icterus
7. Hepatosplenomegaly
8. Heart sounds

9. Breath sounds
10. Petechial rash

All patients underwent the following investigations

1. ECG
2. Chest X-ray
3. USG Abdomen
4. Serial Platelet counts
5. Total counts
6. Blood urea
7. Serum Creatinine
8. Dengue IgM/NS<sub>1</sub> testing

Few patients underwent

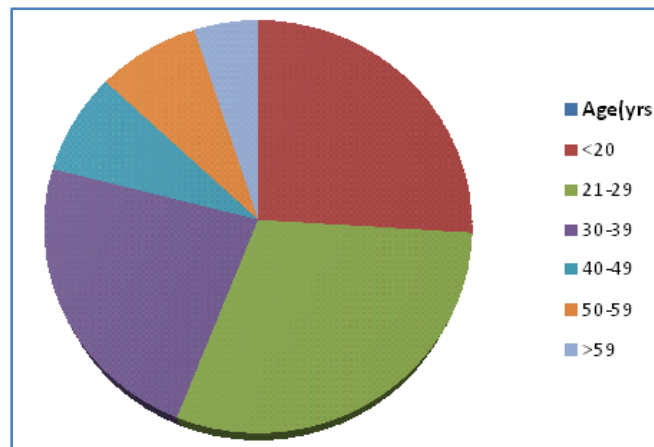
1. 2D Echocardiography

## RESULTS:

### Age Wise Distribution of Cases:

Age(yrs.)	No. of Cases
<20	26
21-29	30
30-39	23
40-49	8
50-59	8
>59	5

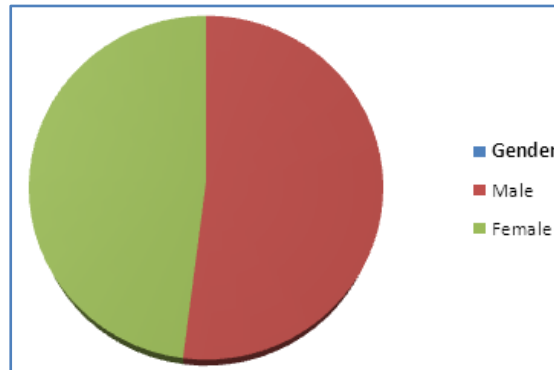
**Table 1**



**Gender Wise Distribution of Cases:**

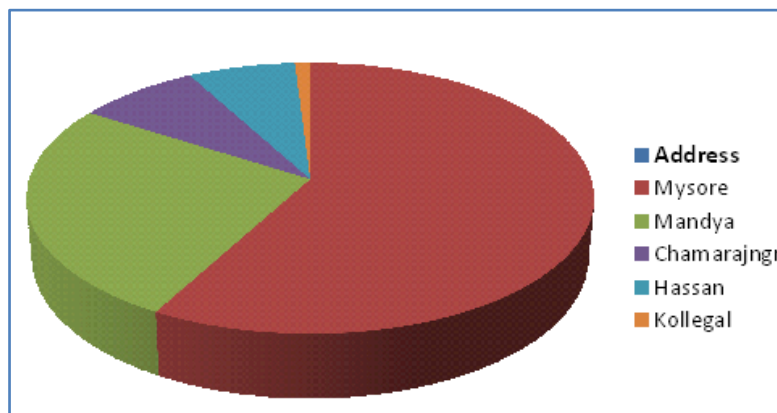
Gender	No. of Cases
Male	52
Female	48

Table 2

**Figure 2****Geographical Distribution of Cases:**

Address	Cases
Mysore	58
Mandya	26
Chamarajngr	8
Hassan	7
Kollegal	1

Table 3

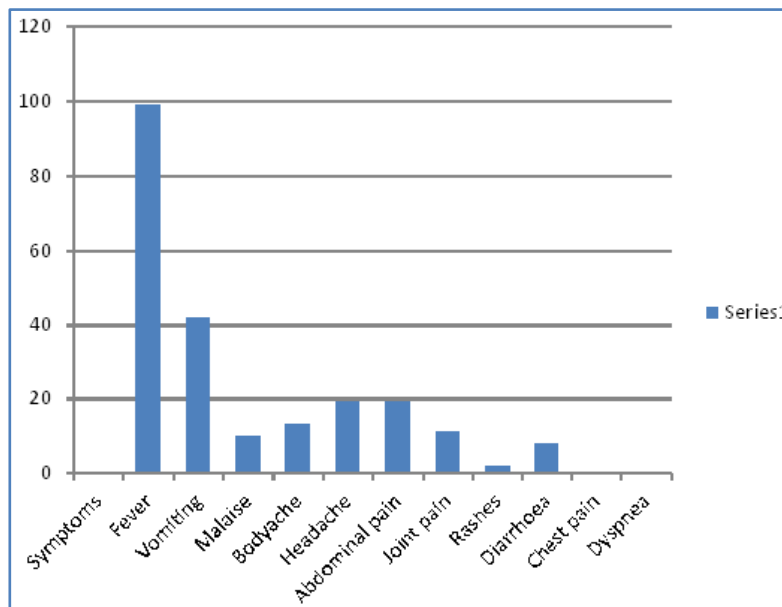
**Figure 3**

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### Analysis of Various Symptoms:

Symptoms	Cases
Fever	99
Vomiting	42
Malaise	10
Bodyache	13
Headache	19
Abdominal pain	19
Joint pain	11
Rashes	2
Diarrhoea	8
Chest pain	0
Dyspnea	0

**Table 4**



**Figure 4**

### Pulse Rate Distribution among Cases:

Pulse Rate	Cases
<40	1
41-60	26
61-100	61
>100	12

**Table 5**

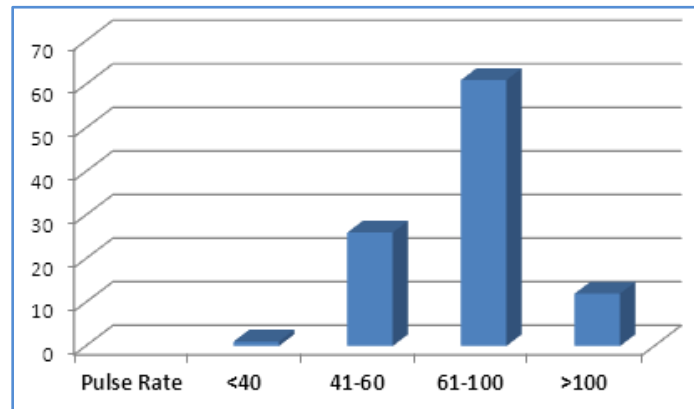


Figure 5

#### Distribution of Platelet Counts among Cases:

Platelet Count	Cases
<50000/ $\mu$ L	32
50000-100000/ $\mu$ L	35
100000-150000/ $\mu$ L	11
>150000/ $\mu$ L	22

Table 6

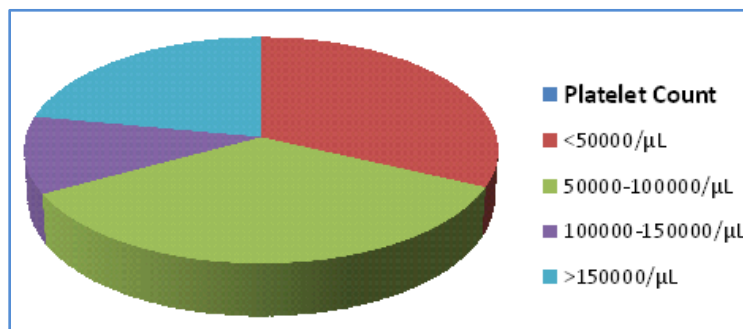


Figure 6

#### Clinical Spectrum of Cases:

Clinical Spectrum	Cases
Dengue Fever	22
DHF	72
DSS	6

Table 7

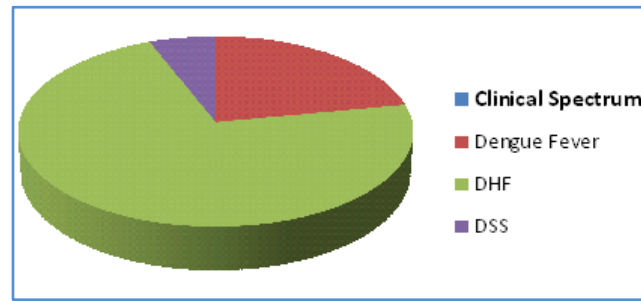


Figure 7

### Electrocardiographic Changes among Cases:

ECG	Cases
Sinus Rhythm	48
Sinus Bradycardia	37
Sinus Tachycardia	14
First Degree Heart Block	1

Table 8

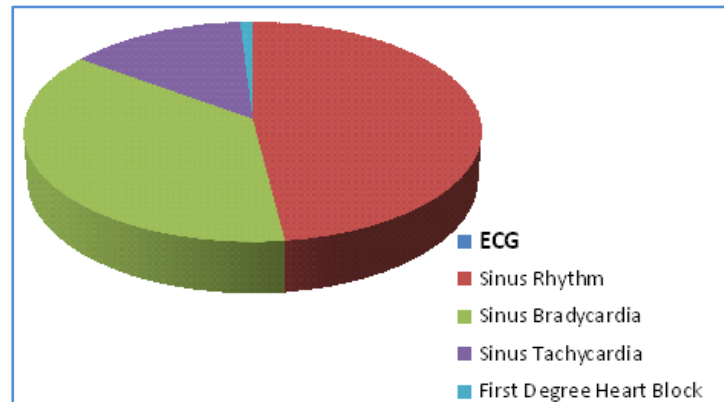


Figure 8

**DISCUSSION:** Dengue virus infection has emerged as the most important and widely spread arboviral disease in the world. Today dengue is endemic in most of the tropical and subtropical countries. The South East Asian regions have recorded increasing incidence of dengue and have contributed to the major portion of global disease burden. Dengue hemorrhagic fever and dengue shock syndrome are endemic to these regions and pose a severe threat to global health.

Dengue virus infection was first reported in India from Chennai in 1780. Today dengue virus and all its clinical forms are documented in almost all parts of India.

K. R. Hospital, Mysore, attached to Mysore Medical College and Research Institute is a tertiary care hospital which not only caters to Mysore district, but also to the neighboring districts of Mandya, Chamarajnagar, and Hassan. Cases of Dengue virus infection have been constantly reported from



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these regions. Bradycardia was a notable feature among initially reported cases of Dengue fever. This has prompted us to undertake the present study. The specificity of our surveillance is increased by including only patients with clinical features of Dengue infection and those with only positive Dengue IgM/NS<sub>1</sub> Ag.

In the present study, a total of 100 patients of Dengue fever were analyzed. The most common age group affected in our study was 20-39 years (53%).

Sl.No.	Author	Year	Place	Age(yrs.)
1.	Gore MM	1996	Delhi	5-20
2.	Baruah J	2002	Manipal	5-20
3.	Dash PK et al	2003	Gwalior	<15
4.	Neeraja M	2004	Hyderabad	20-39
5.	Present study	2010	Mysore	20-39

Table 9

This is comparable to the study done by Neeraja et al in 2004, in Hyderabad.<sup>8</sup> The mean age in the present study is 30.81 years. This is comparable to the study done by Gupta et al (30.15 years) in 2008, in New Delhi.<sup>9</sup>

In our study, the incidence among males and females is almost equal. This is comparable to the study done by Dash P K et al in 2003, in Gwalior.<sup>10</sup>

Sl. No.	Author	Year	Place	M:F Ratio
1.	Dash P K et al	2003	Gwalior	1.28:1
2.	Neerja M	2004	Hyderabad	2:1
3.	Gupta et al	2008	New Delhi	1.8:1
4.	Present study	2010	Mysore	1.08:1

Table 10

Amongst the cases in our study, 58% cases were from Mysore, 26% cases were from Mandya, 8% cases from Chamarajnagar, 7% cases from Hassan, 1% from Kollegal districts.

The various clinical features in our study included fever(99%), vomiting(46%), headache(19%), abdominal pain(19%), bodyache(13%), joint pain(11%), malaise(10%), diarrhea(8%), rashes(2%); hepatomegaly(7%), splenomegaly(7%), pleural effusion(4%), ascites(2%); chest pain or breathlessness was not seen among any of the patients.

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SI No.	Study	Fever%	Vomiting %	Headache %	Bodyache %	Malaise%	Hepatomegaly%	Splenomegaly%	Pleural Effusion%	Ascites%	Rashes%
1.	Dash PK et.al 2003	100	-	86	50	70	-	-	-	-	56
2.	Neeraja M 2004	100	-	74	-	53	80	-	-	-	41
3.	Gupta et. al 2008	92	-	-	-	-	-	-	-	-	82
4.	Present study 2010	99	46	19	13	10	07	07	04	02	02

Table 11

The clinical spectrum of cases in our study included 22% cases of Dengue fever (DF), 72% cases of Dengue Hemorrhagic fever (DHF), 6% cases of Dengue Shock Syndrome (DSS).

SI No.	Study	Year	Clinical Spectrum
1.	Neeraja M et.al	2004	DF 85%, DHF 5%, DSS 10%
2.	Gupta et. al	2008	DHF 72%, DSS 28%
3.	Present study	2010	DF 22%, DHF 72%, DSS 6%

Table 12

In our study, 78% cases had thrombocytopenia, 22% had normal platelet counts.

In our study clinical pulse rate distribution amongst cases showed 27% with bradycardia, 61% with relative bradycardia, and 12% with tachycardia. This is comparable to study done by Gupta et al in 2008<sup>9</sup>; 18% with bradycardia, 64% with relative bradycardia, 18% with tachycardia.

Electrocardiographic changes in our study showed 37% with sinus bradycardia, 48% with normal sinus rhythm, 1% with first degree heart block, and 14% with sinus tachycardia.

In the study done by Gupta et al in 2008, 11% had sinus tachycardia, 77% had normal sinus rhythm, and 12% had sinus tachycardia. However, in the study done by Gupta et al, only 28 patients were studied retrospectively, but our study was an observational study involving 100 patients.<sup>9</sup>

**CONCLUSION:** Bradycardia was a predominant occurrence amongst total of 100 cases of Dengue fever analyzed. 88% of the cases had bradycardia. (61% had relative bradycardia and 27% bradycardia. Majority of the patients on ECG showed sinus bradycardia (37%) and normal sinus rhythm (48%). Hence, awareness of bradycardia as a clinical finding, can help in the early recognition of Dengue and potentially reduce complications and death associated with dengue virus infection.

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