**World Journal of Pharmaceutical Sciences**
ISSN (Print): 2321-3310; ISSN (Online): 2321-3086
Published by Atom and Cell Publishers 
Available online at: http://www.wjpsonline.org/
**Original Article**

# Epidemiology and seropositivity of dengue fever cases in a tertiary care hospital in Navi Mumbai, Maharashtra

Dr. Sharvari A. Samant, Associate Professor, Department of Microbiology, MGM Medical College, Navi Mumbai, India

**Received: 24-07-2015 / Revised: 13-08-2015 / Accepted: 21-08-2015**

## ABSTRACT

The incidence of dengue has grown dramatically around the world. Due to unavailability of vaccine its prevention and control solely depends on the epidemiological surveillance which could help in implementation of effective control measures. Hence, it is important to characterize the circulating serotypes in the community. The present study was conducted to evaluate the epidemiology of dengue fever cases in Navi Mumbai area and to detect the circulating serotype in this region. A total of 1053 blood samples were tested for Dengue NS 1 Antigen and Dengue specific IgM and IgG Antibodies by rapid immune-chromatography. A total of 11 representative serum samples were sent to National Institute of Virology, Pune for serotyping. 277 blood samples showed positive result for either IgM, IgG Antibody or NS 1 antigen. They were predominantly observed in the males and in the age group of 18 to 45 years. The maximum number of positive cases was reported in post monsoon months. They were found to be DV 2 and DV 3 serotypes. The serotyping data from these samples reflects the epidemiology of circulating serotype in Navi Mumbai area which may help to develop effective control and management strategies against this impending dengue menace.

**Key-Words:** Dengue Hemorrhagic Fever, Dengue shock Syndrome, NS 1 Antigen, Dengue serotypes

## INTRODUCTION

Dengue is an arthropod borne acute viral infection of public health significance. It is widespread but predominantly seen in tropical and sub-tropical countries with significant mortality and morbidity. India is one of the seven identified countries in South East Asia region and may soon transform into a major niche for dengue infection. [1] Each year there are as many as 100 million cases of dengue fever with 500,000 cases of Dengue Hemorrhagic Fever and estimated 22,000 dengue related deaths.

Dengue fever was first referred as ‘water poison; associated with flying insects. It was also named as ‘break bone fever’ because of the symptoms of myalgia and arthralgia. It is transmitted by the vector *Aedes egypti* which breeds in water. It is a day-time feeder and usually bites early in the morning and before dusk.

Clinical manifestations of dengue range from self-limiting flu like illness with fever, headache and myalgia with sometimes anorexia, nausea, abdominal pain, retro-orbital pain and joint pain. The more severe form is Dengue Hemorrhagic Fever (DHF) which is characterized by the onset of dramatic hemorrhagic manifestation. Dengue Shock Syndrome (DSS) is the most severe form of DHF due to significant intravascular volume depletion, hemodynamic compromise and tissue perfusion. [2]

Dengue fever is caused by dengue virus (DV) belonging to genus Flavivirus (Family Flaviviridae). There are four serotypes of the virus referred to as DV-1, DV-2, DV-3 and DV-4. All four serotypes can cause full spectrum of disease from sub-clinical infection to DHF and DSS. Infection with one serotype confers life-long immunity to that serotype and a few months cross-immunity to other serotypes. Sequential infection of two serotypes leads to more severe type of disease like DHF. All serotypes are now clinically circulating globally and exhibit hyperendemicity. [3, 4]

The diagnosis of dengue fever can be established either by demonstrating dengue specific

***Corresponding Author Address:** Dr. Sharvari A. Samant, Associate Professor, Department of Microbiology, MGM Medical College, Navi Mumbai, India*

immunoglobulins (IgM and IgG) or detection of viral antigen. Non-structural protein 1 ($NS_1$) of dengue virus begins to appear in blood from day one of infection while IgM antibodies appear from the seventh day onward. Dengue specific IgG appears after 14 days. $NS_1$ antigen can be detected during acute phase of disease. It possesses group as well as type specific determinant. Thus detection of $NS_1$ antigen can help in early diagnosis and timely management of Dengue fever.

Epidemiology of dengue infection is changing with increase of outbreaks. All four serotypes have been reported in India with changes occurring in the leading serotypes. Since there is no vaccine available for dengue fever, the prevention and control solely depends on the epidemiological surveillance. This could help in estimating the load of disease and implementation of effective control measures. Hence, it is important to characterize the circulating serotypes in the community.

The purpose of this study was to present a comprehensive report on the diagnosis of dengue fever cases detected in Navi Mumbai area from January 2014 to December 2014. The present study also aims at identifying the dengue serotypes circulating in this area.

## MATERIAL AND METHODS

The study was conducted in department of Microbiology, MGM Medical College, Navi Mumbai during January 2014 to December 2014. Blood samples were collected from clinically suspected DF/Dengue Hemorrhagic Fever (DHF) cases within 10 days of onset of fever. A total of 1053 blood samples from all ages and both the sexes were collected for the study after taking a written consent. Serum samples from the patients were tested for Dengue NS $_1$ Antigen and Dengue specific IgM and IgG antibodies by rapid immune-chromatography (ICT) test. Dengue Day 1 kits were procured from J. Mitra and Company Pvt. Ltd. Mumbai. Results were validated only after checking the control band. A total of 11 representative serum samples were collected in the first 4 days of fever and tested positive for $NS_1$ antigen. They were sent to National Institute of Virology, Pune for serotyping. Serotyping was done as per Lanceotti's Procedure. [5]

## RESULTS AND DISCUSSION

Dengue is emerging as a major public health problem in India. It is an acute viral infection with potential fatal complications. Dengue fever is known to be endemic in many parts of India for about 1-2 centuries as a benign and self-limiting disease. There has been a considerable increase in the geographic spread and severity of disease over last 3-4 decades.

The diagnosis of dengue fever is made on clinical features and laboratory tests for detection of IgM, IgG antibodies and $NS_1$ Antigen. Combination of $NS_1$ antigen and antibody tests increases the diagnostic efficiency for early diagnosis of dengue infection. [6] A total of 1053 blood samples were tested for dengue viral infection under study. Out of them 277 blood samples showed positive result for one or the more parameters. (Ref. Table 1) Out of 277 cases under study, sex-wise distribution revealed male predominance. Male to female ratio was found to be 1.2:1. (Ref. Table 2) Age-wise distribution of dengue fever cases showed that the incidence was maximum in the age group 18 to 45 years followed by 5 to 18 years. (Ref. figure 1)

A total of 277 cases of dengue fever were detected in one year from Jan 2014 – Dec 2014. Maximum seropositivity to dengue was observed in the month of September, October and November i.e. post monsoon period. This could be because of presence of stagnant water after rainfall that favors the mosquito breeding and leads to more cases of dengue. Various authors like Chandralekha et al. [7], Bharaj et al. [8], and Dar et al. [9] have also reported similar findings. In the present study we used rapid ICT kit which detects dengue specific antigen and antibodies which helps in identifying primary and secondary infection. Out of 277 positive cases, $NS_1$ Ag was detected in 132 (47.7%) cases and presence of dengue specific IgM antibodies with or without $NS_1$ was observed in 46 cases indicating primary infection. Presence of dengue specific IgG antibody with or without any other parameter were detected in 49 patients indicates secondary infection.

A total of 11 representative serum samples were collected in the first 4 days of fever and tested positive for $NS_1$ antigen. They were sent to National Institute of Virology, Pune for serotyping. They were found to be DV-2 and DV-3 types. The epidemiology of dengue virus and its prevalent serotypes has been ever changing. DV-2 was isolated during epidemics of dengue in Gujarat during 1988 and 1989. [10] DV-2 was the predominant serotype circulating in Northern India. [11-13] DV-3 has been isolated during the epidemics at Vellore in 1966 [14], Calcutta in 1983 [15], Rajasthan in 1985 [16], Gwalior in 2003 and 2004 [17, 15] and Tamil Nadu in 2010 [18]. In the 2003 outbreak at Delhi all four serotypes were circulating in Delhi amongst which DV-2 was the most common circulating serotype [19,20] whereas DV-3 was predominant in some other parts of the

country [21]. In the year 2006, Delhi was hit by outbreak due to multiple serotypes, in which DV-3 was most common [22]. Recovery from infection by one serotype provides lifelong immunity against a particular serotype but imparts only partial immunity against subsequent infections by other serotypes. This could be the reason for change in epidemiology of dengue serotypes.

## CONCLUSION

From the present study it can be concluded that the dengue cases are on the rise especially in the post monsoon season. Methods like virus isolation and genomic RNA detection (PCR) need specialized laboratory, trained lab personnel that are not available in all diagnostic laboratories but rapid ICT tests can be used for surveilance studies. The serotypic data from these samples reflect the circulating serotype in Navi Mumbai area and may help to develop effective control and management strategies against this impending dengue menace.

## ACKNOWLEDGEMENT

The author is thankful to Dr. Cecilia Dayaraj, Scientist 'E' In Charge, Dengue Lab. National Institute of Virology, Pune, India for serotyping the Dengue virus.

**Table 1: Distribution of dengue fever cases in Year 2014**

| Total number of cases | Positive | Negative |
|---|---|---|
| 1053 | 277<br>26.3% | 776<br>72.7% |

**Table 2: Sex-wise distribution of Dengue fever cases**

| Total number of cases | Male | Female |
|---|---|---|
| 277<br>% | 151<br>54.5% | 126<br>45.5% |

**Figure 1: Age wise distribution of Dengue fever cases**

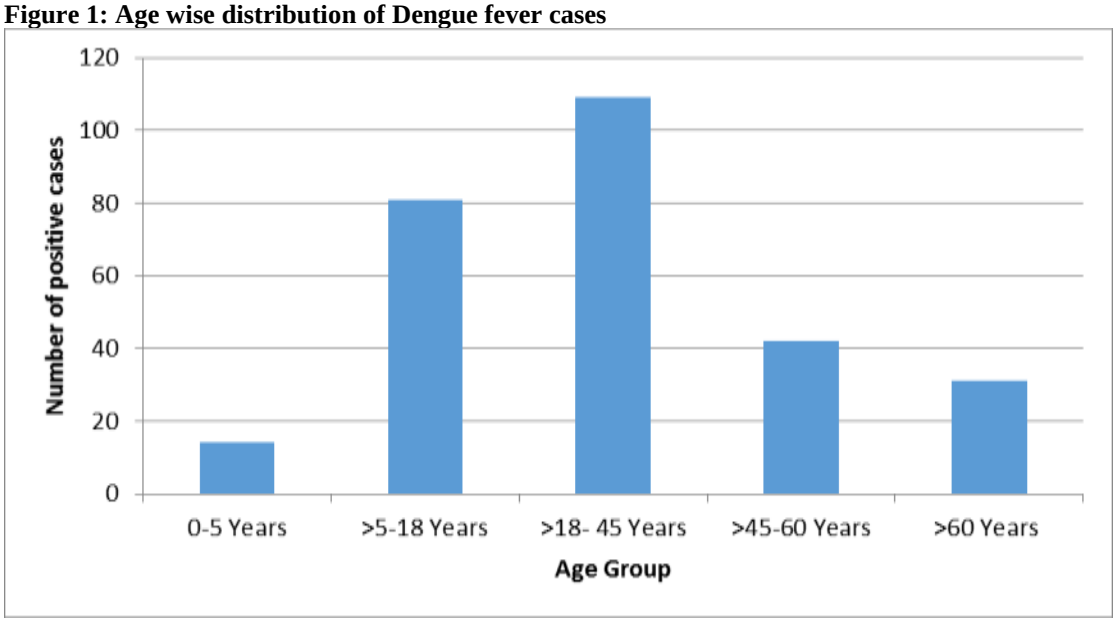
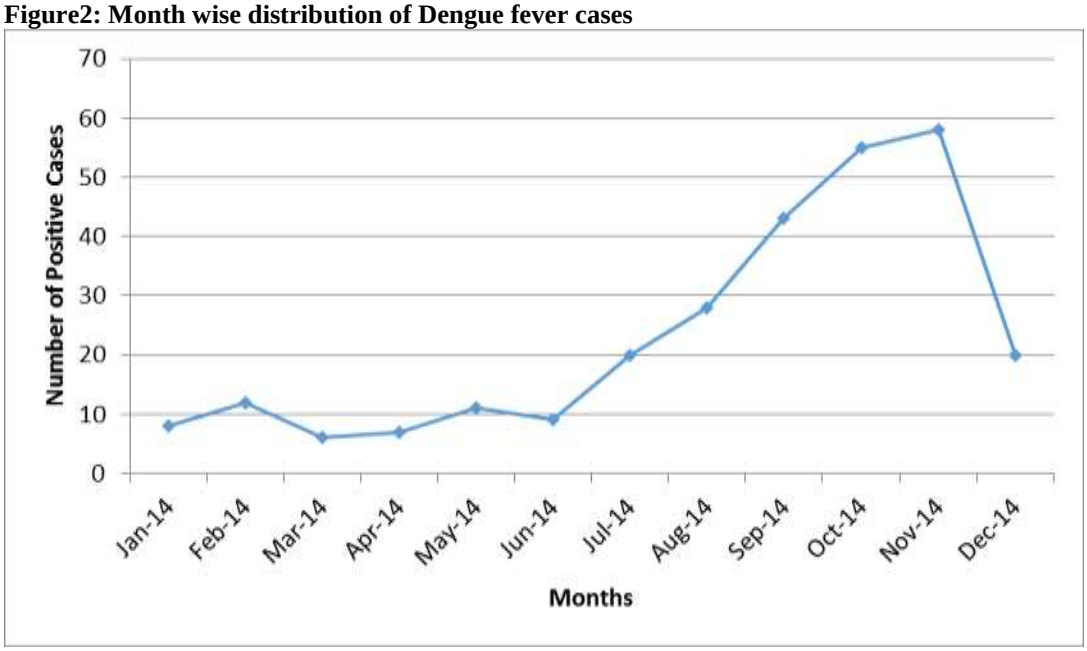


**Figure2: Month wise distribution of Dengue fever cases**




## REFERENCES


1. Kumar A et al. Clinical manifestations and trend of Dengue cases admitted in a tertiary care hospital, Udupi District, Karnataka. Indian J Commun Med 2010;55: 586-590.
2. Changa K et al. When less is more: can we abandon prophylactic platelet transfusion in Dengue fever? Ann Acad Med Singapore 2011; 40: 539-545.
3. Rodhain F, Rosen L. Mosquito vectors and dengue virus-vector relationships. In: Gubler DJ, Kuno G, editors. Dengue and Dengue Hemorrhagic Fever. New York: CAB International; 1997: 45-60.
4. Gubler DJ. The changing epidemiology of yellow fever and dengue, 1900 to 2003: Full circle? Comp Immunol Microbiol Infect Dis 2004;27:319-30.
5. Lanciotti et al. Rapid Detection and Typing of Dengue Viruses from Clinical Samples by Using Reverse Transcriptase-Polymerase Chain Reaction. Journal of Clinical Microbiology 1992;30(3): 545-551.
6. Blackshell SD et al. Evaluation of the Panbio dengue virus nonstructural 1 antigen detection and IgM antibody enzyme-linked immunosorbent assays for the diagnosis of acute dengue infections in Laos. Diagn Microbiol Infect Dis 2008;60: 43-49.
7. Chandralekha et al. The north Indian dengue outbreak 2006: A retrospective analysis of intensive care units admissions in a tertiary care hospital. Trans R Soc Trop Med Hyg 2008; 102:43-147.
8. Bharaj P et al. Infections by all four dengue virus serotypes during an outbreak of dengue in 2008 in Delhi, India.Virol J 2008; 5:1.
9. Dar L et al. Co- circulation of dengue serotypes, Delhi, India. Emerg Infect Dis 2003;12:352- 353.
10. Mahadev PV et al. Dengue in Gujarat state, India during 1988 & 1989. Indian J Med Res. 1993;97:135–44.
11. Dar Let al. The first major outbreak of dengue hemorrhagic fever in Delhi, India. Emerg Infect Dis. 1999;5:589–90.
12. Agarwal R et al. A clinical study of the patients with dengue hemorrhagic fever during the epidemic of 1996 at Lucknow, India. Southeast Asian J Trop Med Public Health, 1999;30:735–40.
13. Parida MM et al. Serological & virological investigation of an outbreak of dengue fever in Gwalior, India. Indian J Med Res.2002;116:248–54.
14. Myers RM et al. Virological investigations of the 1966 outbreak of Dengue type 3 in Vellore, Southern India. Indian J Med Res. 1969;57:1392–401.
15. Dash PK et al. Reemergence of dengue virus type-3 (subtype-III) in India: implications for increased incidence of DHF &DSS.Virol J. 2006;3:55–65.
16. Chouhan GS et al. Clinical &virological study of dengue fever outbreak in Jalore city, Rajasthan 1985.Indian J Med Res. 1990;91:414–8.
17. Dash PK et al. Emergence of dengue virus type-3 in northern India. Southeast Asian J Trop Med Public Health. 2005;36:370–7.
18. Paramasivan R et al. An outbreak of dengue fever in Tirupur, Coimbatore district, Tamil Nadu. Indian J Med Res. 2010;132:105–7.
19. Kumaria R, Chakravarti A. Molecular detection and serotypic characterization of dengue viruses by single-tube multiplex reverse transcriptase-polymerase chain reaction. Diagn Microbiol Infect Dis 2005;52:311-6.
20. Gupta E et al. The changing epidemiology of dengue in Delhi, India. Virol J 2006;3:92.
21. Chaturvedi UC, Nagar R. Dengue and dengue haemorrhagic fever: Indian perspective. J Bioscience,2008;33:429-41.
22. Bharaj P et al. Concurrent infections by all four dengue virus serotypes during an outbreak of dengue in 2006 in Delhi, India. Virol J 2008;5:1.