

# Seroprevalence of Dengue Virus in a Tertiary Care Hospital, Rajkot, Western India

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## Abstract

Dengue fever and Dengue Haemorrhagic fever (DF/DHF) is an acute viral disease transmitted by the bite of an infected female mosquito- *Aedes aegypti*. The dengue virus causes significant morbidity and mortality in many parts of the world, including India where it was first isolated in Calcutta, West Bengal during 1945. This study was conducted to know the seroprevalence of Dengue virus in a tertiary care hospital, Gujarat. Methods: Blood for serological studies are carefully collected taking due universal precautions from suspected DF/DHF cases (a) as soon as possible after hospital admission or attendance. All the patients were screened for Dengue NS1 and anti-dengue IgM antibodies by Enzyme Linked Immunosorbent Assay (ELISA). The study period was 6 months from June 2020 to December 2020. Results: From a total of 6238 serum samples 2764 tested for Dengue NS1 and IgM, 2764 (44.3%) were positive. 1606 (58.1%) were only NS1 positive and 1158 (41.9%) were IgM positive. Conclusion: Surveillance is prerequisite for monitoring the dengue situation in the area and should be carried out regularly for early detection of an impending outbreak and to initiate timely preventive and control measures. [Int J Res Med Sci 2013; 1(4.000): 448-500]

**Keywords:** DV Dengue Virus, DF Dengue Fever, DHF Dengue Haemorrhagic Fever, IgM Immunoglobulin M.

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## INTRODUCTION

Dengue viruses (DV) belong to the family Flaviviridae and there are four subtypes of the virus referred to as DV-1, DV-2, DV-3, DV-4. It is transmitted mainly by the *Aedes aegypti* mosquito and also by *A. albopictus*. DV is a positive stranded encapsulated RNA virus and is composed of these three structural protein genes, which encode the nucleocapsid or core (C) protein, a membrane-associated (M) protein, an envelope (E) glycoprotein, and seven nonstructural (NS) proteins.

*Bandyopadhyay et al., [1]* Dengue is a complex disease with a wide spectrum of clinical presentation following the period of incubation, most patients experience a sudden onset of fever which can remain for 2-7 days and is often accompanied by symptoms like myalgia, arthralgia, anorexia, sore throat, headaches and a macular skin rash. It's during this period that differentiating dengue from other febrile diseases proves troublesome. The majority of people experience a self-limiting clinical course, which does not progress to severe forms of dengue, Dengue Haemorrhagic fever (DHF), or Dengue Shock

Syndrome (DSS). Secondary dengue infections or particularly virulent viral strains are two factors thought to be associated with increased risk of severity [2]. In severe cases, Thrombocytopenia and increased vascular permeability can result in haemorrhagic shock complications. Currently, neither a vaccine nor specific antiviral therapy exists [3]. However, with prompt case detection and appropriate clinical management, including initiation of intravenous rehydration, the case fatality of severe dengue focuses on effective vector control methods, which are limited [4]. DV causes subclinical infection to a mild self-limiting disease, the dengue fever (DF), a severe disease that maybe fatal and the dengue hemorrhagic fever/ dengue shock syndrome (DHF/DSS).

In 2012, dengue was classified by the World Health Organization (WHO) [12] as the most important mosquito-borne viral disease in the world. Due to significant geographic spread of the virus and its vector into previously unaffected areas and the subsequent costly burden of disease it brings IgM antibody is the first immunoglobulin isotype to appear. In a suspected case of dengue, the presence of antidengue IgM

antibody suggests recent infection. Antidengue IgM detection using Enzyme Linked Immunosorbent Assay (ELISA) represents one of the most important advances and has become an invaluable tool for routine dengue diagnosis. Specifically, MAC ELISA (IgM antibody capture ELISA) diagnosis is based on detecting dengue specific IgM [5]. NS1 Antigen is also very useful in detecting Dengue virus in patients with hotherwise unexplained fever since 3 days or less.

**MATERIALS AND METHODS**

The blood samples were collected from clinically suspected dengue fever cases. The study was conducted between May-December 2020 in the Department of Microbiology at a tertiary care hospital, Western Gujarat. The samples were screened for the

presence of dengue-specific IgM antibody by MAC ELISA using a kit prepared by the National Institute of Virology, Pune, India (asa nintegral part of th National Vector Borne Disease Control Programme), strictly following the manufacturer’s protocol [6]. NS1 Ag was detected in the sera by PanBio NS1Ag ELISA kit. Haemorrhagical parameters (leucocyte count, Hb and platelet count) of dengue positive patients were also observed and correlated.

**RESULTS AND DISCUSSION**

Total of 6238 sera samples were tested and dengue positive were 2764 (44.3%) samples. 1158 samples were tested positive by IgM Elisa and 1606 samples by NS1 Elisa. Female Preponderance with 54% was observed over males.

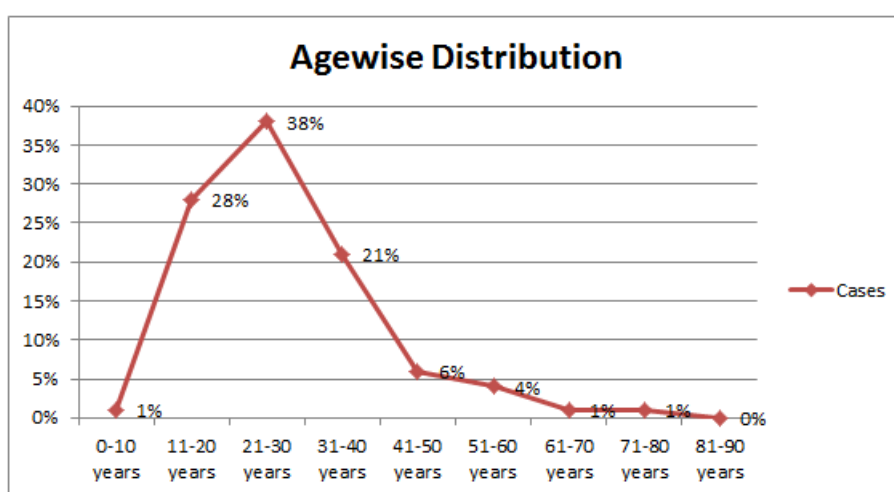


Fig-1

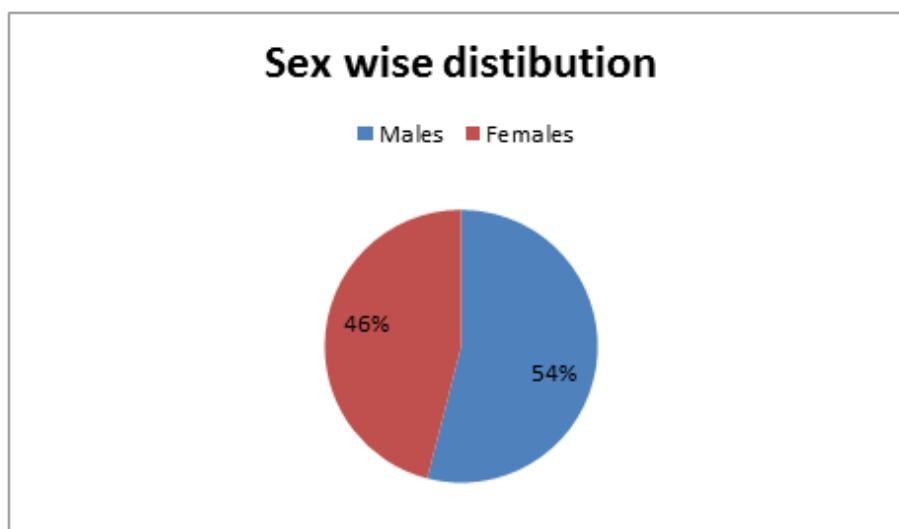


Fig-2

Fig 1 and 2 shows distribution of the number of the dengue cases in various age groups in either sex for NS1Ag and IgM tests respectively. It clearly shows that the highest number of cases belonged to the age

group 11-30 year and females clearly outnumbered males. The outbreak of dengue mainly occurred in the months of August to December in 2020 as in figure 3.

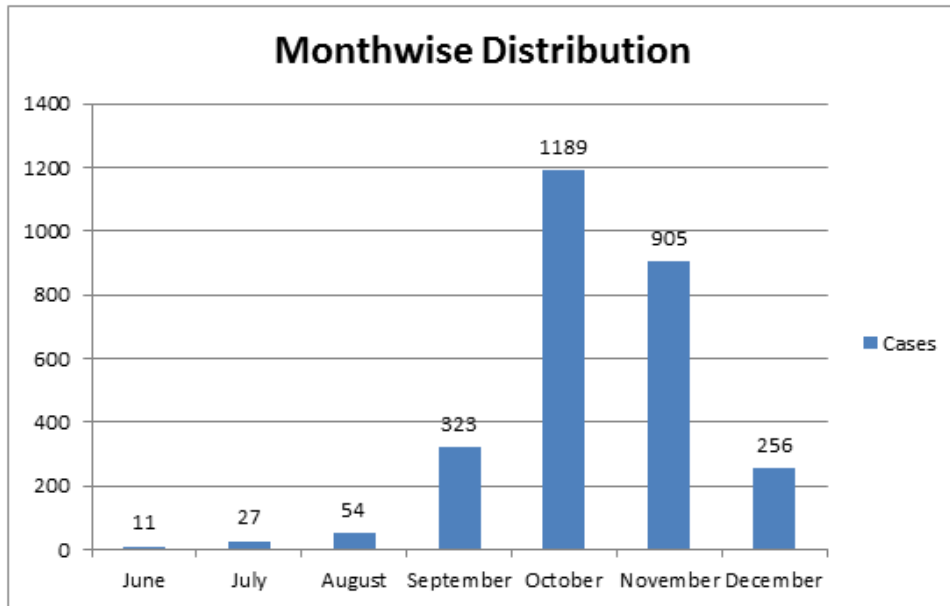


Fig-3

Fig 3 month wise distribution of the total dengue cases in the year 2020. The highest numbers of cases were recorded during the monsoon and post monsoon periods. The number of affected cases declined with the onset of winter. Dengue is one of the re-emerging viral infections. India witnesses dengue

fever outbreak every year. There has been a considerable increase in the geographic spread, number of cases and severity of the disease in the past four decades. Reason may be there is drastic change in the environment due to rapid urbanization and increase in transportation facilities in several parts of India.

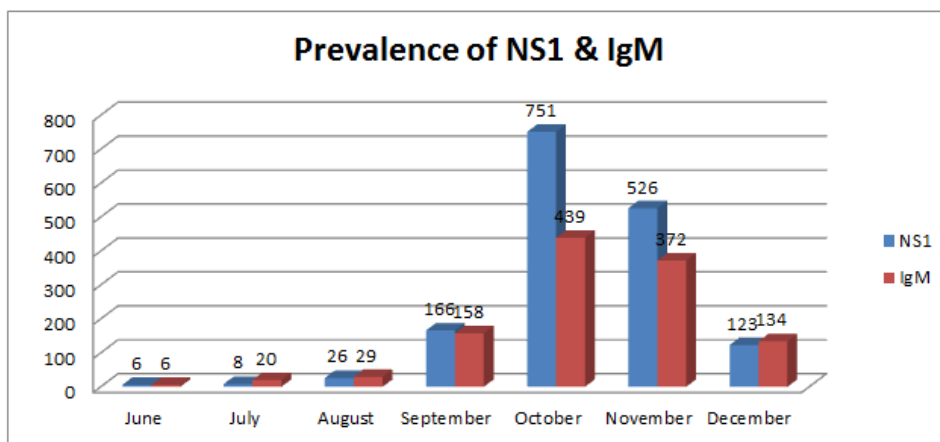


Fig-4

In the present study, 44.3% of the suspected cases were found serologically positive for dengue. The remaining 55.7% cases were serologically negative for dengue. In our study, the highest number of cases belonged to the age group 11-30 year and females clearly outnumbered males which was in accordance with Gupta et al., [11] and Kumaria et al. study which also showed maximum cases in the age group of 21-30 years but with male preponderance.

The young adults getting more affected reflects the presence of non-immune adult population falling prey to the circulating serotype of dengue virus or they could be involved in more outdoor activities.

Sarkar et al., [10] however, reported maximum cases in the age group 0-10 years with female preponderance. Concordance study was also observed by Chakravarti et al., [9] who found highest seropositivity for dengue in female gender for both NS1 antigen and IgM. Higher preponderance of females might be due to their more outdoor activities resulting in more exposure to day-time biting mosquitoes. The vector mosquitoes (Aedes sp.) are mainly domestic and peridomestic in nature and females have a greater chance of exposure to mosquito bites. The lower positivity rates in males may be attributed to lower reporting rates. However, contrasting results were reported by Agarwal et al., [8]

and Wali *et al.*, [7] found twice number of male patients as compared to female patients.

In the present study the majority of the cases were reported during the monsoon and post monsoon seasons, which indicated an active viral transmission during monsoon and postmonsoon season. *Aedes aegypti* vector mosquito breeds during the rainy season and continues to reproduce and add to its number usually till the winter season.

The maximum dengue positive cases were observed from the 1<sup>st</sup> week of September to almost mid-October for both seromarkers of dengue.

There is no specific drug and vaccine available and treatment is only supportive. Therefore control measures to stop vector and disease is extremely important. As most of the cases reported during the postmonsoon period continue, coordinated efforts should be made to control the transmission of vector and prevent the outbreak. A long term surveillance study may help to provide more information about the intensity, seasonal incidence and seasonal effect

## CONCLUSION

In conclusion rapid increase in the dengue cases in 2020 became a public health concern as majority of cases were the young adolescents and adults. Most of the cases were reported in monsoon and post-monsoon periods indicating an increased vector borne transmission.

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