Original Research Article

Seroprevalence and seasonal trend of dengue virus infection at tertiary care hospital, Valsad

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Abstract

Background: Dengue is a vector borne febrile illness affecting tropical and subtropical regions of world including India. It is major public health problem in India because of rapid explosive urbanisation and absence of specific antiviral treatment. It presents with mild fever and ends with life threatening complication like Dengue Shock Syndrome or Dengue Hemorrhagic Fever. Regular epidemiological surveillance and appropriate vector control measures is the only way to prevent transmission of diseases. **Aims and Objective:** To study the prevalence of Dengue virus infection with seasonal trend at tertiary care hospital, Valsad. **Materials and Methods:** The study was conducted from July 2015 to December 2018 at tertiary care hospital, Valsad. Blood samples from suspected cases were collected and tested for NS1 antigen detection by Dengue NS1 Ag enzyme immunoassay kit and for IgM antibody by NIV Dengue IgM capture ELISA kit based on their duration of illness. **Result:** Out of total 2830 serum samples tested, 674 (23.81%) were found positive for dengue virus infection. 461 samples were positive from male patients and 213 samples were positive from female patients with male female ration of 2.1:1.The most commonly affected age group was below 20 years of age (25.84%) followed by 21-40 years of age group (24.54%). There is a gradual raise in the positivity rates from July reaching a pick by October. **Conclusion:** The study concludes that Dengue infection has been established in semi urban area of Valsad with male predominance. Dengue virus infection is high during monsoon and post monsoon seasons due to increase vector breeding. Continuous epidemiological surveillance, appropriate vector control measures and early diagnosis by ELISA are necessary for effective Dengue control programme.

Key Word: Dengue Shock Syndrome, Dengue Hemorrhagic Fever, Dengue NS1 Ag enzyme immunoassay kit, NIV Dengue IgM capture ELISA kit

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INTRODUCTION

Dengue fever is an acute febrile illness caused by Arbovirus affecting mainly the tropical and subtropical regions of the world.[1] It is endemic in over 100 countries with 2.5 million people at risk.[2] The southeast asian region mainly countries like India, Sri Lanka, Bangladesh are experiencing increase in reported cases of Dengue with nearly 75% of current global disease burden.[3] The name 'Dengue' is derived from the Swahili word '*Ki denga pepo*', which means 'sudden seizure by the demon'. Following the Philadelphia epidemic in 1780, it was called as 'break bone fever' by Benjamin Rush.[4] Dengue virus is an arthropod borne virus *Arbovirus*, belonging to family Flaviviridae and genus Flavivirus. It consists of three structural (C, prM and E) and seven non structural (NS1, NS2A, NS2B, NS3, NS4A, NS4B AND NS5) proteins. The dengue virus is transmitted by *Aedes aegypti* and *Aedes albopictus* mosquito.[5, 6] Dengue virus causes illness ranging from self limiting classical dengue fever (CDF) to life threatening complications like Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS).[7]The mortality rate of DHF in most countries is 5%, likely seen in young children and adult.[8, 9] Dengue is endemic in Indian subcontinent and associated with urban epidemic and major health problem. The first epidemic of Dengue infection was seen in Kolkata in 1963 and after

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that several epidemics have been seen in different state of India.[10, 11, 12, 13] It is caused by four distinct serotype of virus; DEN1, DEN2, DEN3 and DEN4.[6, 14]Recovery from infection by one serotype can confer lifelong immunity to that serotype. Primary infection with any serotype cause classical dengue fever, but secondary infection with other serotypes cause more complication like DHF and DSS. It is due to antibody mediated immune enhancement.[5, 7, 15]

MATERIALS AND METHOD

The study was conducted at Microbiology Department, GMERS Medical College, Valsad from July 2015 to December 2018. Blood samples from all clinically suspected cases of Dengue fever with or without hemorrhagic manifestation were collected from all patients under total aseptic precautions. The clinical basis for suspecting dengue infected patient was based on WHO definition.[16] Serum samples were tested for NS1 antigen detection by using commercially available Platelia Dengue NS1 Ag enzyme immunoassay kit manufactured by Bio Rad, France. Samples were tested for IgM antibody detection by using NIV Dengue IgM capture ELISA kit manufactured by National Institute of Virology, Pune. The choice of diagnostic test was based on duration of onset of illness. For confirmation of dengue infection, Government of India recommends use of ELISA based antigen detection test (NS1) for diagnosing the cases from the first day onwards and antibody detection test IgM capture ELISA (MAC-ELISA) for diagnosing after the fifth day of onset of dieases.[17, 18]

RESULT

Total 2830 serum samples of suspected cases were tested during the study period, out of which 674 (23.81%) samples were positive for Dengue infection. From total 2830 samples, 1699 samples were tested for Dengue NS1 antigen and 1131 samples were tested for Dengue IgM antibody. Out of 1699 samples which were tested for Dengue NS1 antigen, 366 were positive and 1131 samples, which were tested for Dengue IgM antibody, 308 were positive. (Table 1) Out of total 2830 samples, 1553 patients were male of which 461 (29.68%) were positive and 1277 patients were female of which 213 (16.67%) were positive for dengue infection (Figure 1). Age wise prevalence of dengue virus infection indicates that seroprevalence of dengue virus infection is high in children and young adult age group 0-20 years (215/832-25.85%) than in adult group 21-40 years (361/1471-24.54%) (Figure 2). Age wise distribution of NS1 antigen detection and IgM antibody detection showed individually in table 2. Analysis of monthly data suggested that samples and seropositivity were maximum during months of July-December with highest sample in October month of every year. (Figure 3)

Table 1: Seroprevalence of Dengue virus infection

Test	Total	Positive	Percentage
NS1 antigen	1699	366	21.54%
IgM antibody	1131	308	27.23%
Total	2830	674	23.81%

Table 2: Age wise prevalence of dengue virus infection

Age Group	NS1 Antigen		IgM antibody	
	Total	Positive	Total	Positive
0-20 Years	465	111	367	104
21-40 Years	919	210	552	151
41-60 Years	252	36	168	45
>60 Years	63	9	44	8
Total	1699	366	1131	308

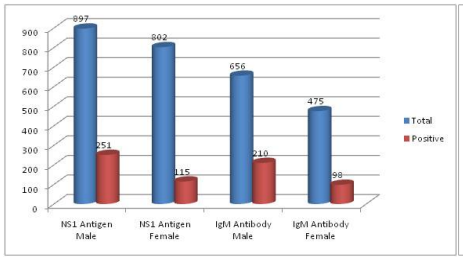

Figure 1

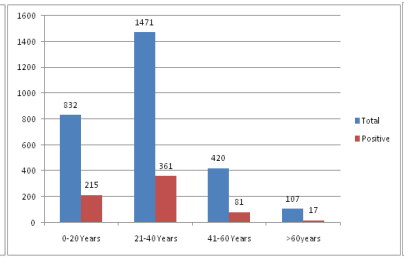

Figure 2

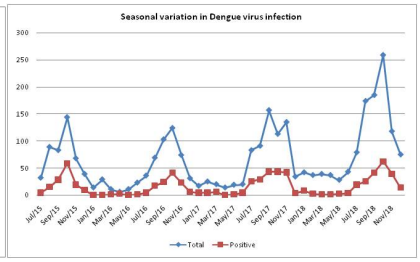

Figure 3

Figure 1: Sex wise prevalence of dengue infection; **Figure 2:** Age wise distribution of Dengue virus infection. **Figure 3:** Seasonal trend of dengue virus infection

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DISCUSSION

Outbreaks of Dengue virus infection are reported in India every year. It starts with mild fever to life threatening complication like Dengue Shock Syndrome and Dengue Hemorrhagic Fever. It is necessary to implicate control and preventive measures and early diagnosis of dengue virus infection. In our study, Seroprevalence rate of Dengue virus infection was 23.81%. These finding are in accordance with other studies conducted in India. [10, 12, 19, 20] Our hospital is tertiary care hospital so samples come from surrounding rural area of Valsad. Rapid, unplanned and unchecked construction development in rural area is another contributing factor to fertile breeding of mosquitoes. The higher prevalence of Dengue virus infection was noted amongst males than females. The male to female ratio in our study was 2.1:1 which correlates with other studies.[10, 19, 21] The lower infection in female was due to they remain stayed at home so less exposed to day biting mosquitoes while males doing more outdoor activities had higher infection rate. The most common age group of infection was below 20 years of age which includes children and young adults. These finding are consistent with several studies done in India [10, 13, 20] and with international studies.[22] The children were more affected due to true endemicity of diseases in this area. For seasonal trend, when we analysed month wise data it noted that suspected cases and positivity rate start increasing from July, reached picked in September and October and declines after December. It is mainly due to monsoon and post monsoon activities. High Seroprevalence during this month was due to stagnation of water during rainfall which acts as fertile new breeding place for mosquitoes. Proper vector control measures if taken during initial rainy seasons, it helps in reduce diseases transmission and prevent epidemic of dengue virus infection.[10, 20]

CONCLUSION

Our study concludes that Dengue virus infection was seen more in male of children and young adult age group with predominance in monsoon and post monsoon seasons. Because of absence of any specific treatment against dengue and more life threatening complication, early diagnosis by NS1 antigen detection and effective vector control is the only method to prevent and control dengue transmission. A seasonal trend observed in dengue infection during monsoon and post monsoon seasons indicate to start early vector control measures and control new breeding mosquito's sites occurred due to stagnant water. The proper mosquito vector control also helps in reduce other mosquitoes borne infection like malaria, chikungunya and filarial during monsoon seasons.

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