

Original research article

## Seroprevalence of Dengue virus Infection in a Tertiary Care Hospital in Dahod, Gujarat.

Jignasha Tadavi<sup>1</sup>, Atul Rukadikar<sup>2</sup>, Shital Sangani<sup>3</sup>, Deepak Deshkar<sup>4</sup>, Jegan C<sup>5</sup>, Rekha Kishori<sup>6</sup>, Nitesh Jaiswal<sup>7</sup>

<sup>1</sup>Assistant Professor, Department of Microbiology, Zydus Medical College and Hospital, Dahod, Gujarat, India

<sup>2</sup>Professor and Head, Department of Microbiology, Zydus Medical College and Hospital, Dahod, Gujarat, India

<sup>3</sup>Tutor, Department of Microbiology, Zydus Medical College and Hospital, Dahod, Gujarat, India

<sup>4</sup>Associate Professor, Department of Microbiology, Zydus Medical College and Hospital, Dahod, Gujarat, India

<sup>5</sup>Tutor, Department of Microbiology, Zydus Medical College and Hospital, Dahod, Gujarat, India

<sup>6</sup>Assistant Professor, Department of Microbiology, Zydus Medical College and Hospital, Dahod, Gujarat, India

<sup>7</sup>Assistant Professor, Department of Microbiology, Zydus Medical College and Hospital, Dahod, Gujarat, India

Corresponding Author: Nitesh Kumar Jaiswal

### Abstract

**Background:** Dengue is an acute viral disease, which includes Dengue fever (DF), dengue hemorrhagic fever (DHF) and Dengue shock syndrome (DSS). The disease has expanded over the last few decades causing high morbidity and mortality.

**Aim of the study:** The study was aimed to determine the seroprevalence of dengue infection among patients attending in Zydus Medical College and Hospital, Dahod, Gujarat during the period from January 2018 to December 2020.

**Methods:** A total of 5252 serum samples from the suspected cases of dengue were processed in Microbiology Laboratory for detecting dengue NS1 antigen by ELISA test.

**Results:** Out of 5252 samples tested, 840 were positive for NS1 antigen by ELISA test contributing case positivity rate of 15.99%. The disease was more prevalent in adult age group of 21- 30 years (29.60%) and was more common in male (65.20%) than female (34.80%). We also reported the seasonal trend of dengue in our district where the case positivity rate was more in monsoon and post monsoon season.

**Conclusion:** It is evident from the present study, that the laboratory test confirming dengue should be extensively used for the purpose of surveillance and control.

**Keywords:** *Dengue, Seroprevalence, NS1 antigen, ELISA.*

### Introduction

Dengue is a mosquito-borne arboviral disease<sup>1</sup>. Dengue infection in human is caused by Dengue viruses (DV), which includes serotype DV-1, DV-2, DV-3, and DV-4<sup>1,2</sup>. *Aedes aegypti* and *A. albopictus* are the two important mosquito vectors responsible for transmission of this disease in rural and urban areas<sup>1</sup>. Clinical manifestations of dengue in symptomatic individual consist of dengue fever, dengue haemorrhagic fever and dengue

shock syndrome<sup>3</sup>. The severity of dengue infections in suspected patients have been classified into dengue without warning signs, dengue with warning signs and severe dengue as per revised WHO case classification 2009<sup>1</sup>. Every year approximately more than 400 million dengue virus infections are reported globally; among them 75% of the cases are asymptomatic<sup>4</sup>. Asian countries contribute to 70% of the global burden of dengue<sup>4</sup>. The National Vector Borne Disease Control Program, (NVBDCP), ministry of health and family welfare, Government of India has reported more than 100000 cases during the period of 2015–2017<sup>5</sup>. However, another study from India has reported annual prevalence of 57,78,406 cases. This indicates the dengue infections in India are under reporting<sup>4,6</sup>. The viral infection has a seasonal trend and the disease peaks after monsoon. However, in Southern and Gujarat state, its transmission is perennial<sup>7</sup>. Nearly all states and union territories in India show endemicity for dengue cases. The highest number of cases was detected from Maharashtra, Odisha, Karnataka, Tamil Nadu, Kerala, and Gujarat states during year 2014-2015<sup>8</sup>. The present study was conducted with objective to determine the seroprevalence of Dengue in Dahod district, a known tribal area of Gujarat, India.

### Materials and Methods

Hospital based retrospective study was conducted at the Department of Microbiology, Zydus Medical College Hospital, Dahod, Gujarat, India for the period of 2018-2020. A total of 5252 serum samples were collected from suspected cases. Cases included of any age group of patients having complain of fever, headache, rash, retroorbital pain, myalgia and other symptoms suspicious of Dengue fever. Patients with Fever confirmed due to noninfectious cause or other causes such as *Leptospira*, Hepatitis or Typhoid and Persons who have receipt of blood /blood products within 3 months and H/o Dengue vaccination were excluded from this study.

The Blood samples were carefully collected by taking universal precautions from clinically suspected patient. 3-5 ml from adult and about 2 ml from pediatric blood samples were collected. The samples were processed for identification of dengue specific NS1 antigen by Platelia NS1 Ag ELISA kit procured from National Institute of Virology, Pune as a part of National Vector Borne Disease Control Programme (NVBDCP).

### Serum separation:

The blood was collected in serum separator tube and kept at room temperature for 30 minutes further it was centrifuged at 3000 rpm for 10 min. Approximately 200 µL serum sample was transferred to the cryovials and further stored at -20°C in a deep freezer.

### Enzyme linked Immunosorbent Assay (ELISA):

The serum samples were screened for NS1 antigen by ELISA test as per the kit manufacturer's instruction. Interpretation of ELISA was done by observing optical density of the test result in the ELISA reader. Cut off value was determined and it was calculated as per the instruction provided in the kit manual.

### Result:

A total of 840 samples out of 5252 serum samples were found positive for Dengue NS1 antigen by ELISA test, contributing case positivity rate of 15.99%.

**Table 1: Age wise distribution of patients tested for Dengue Serology. (Jan 2018 - Dec 2020)**

Age in years	Total No of cases (%)	Total no of Positive cases (%)
0-10 year	515 (9.8%)	90 (10.7%)
11-20 year	1374 (26.2%)	287 (34.2%)
21-30 year	1554 (29.6%)	286 (34%)
31-40 year	715 (13.6%)	95 (11.3%)
41-50 year	494 (9.4%)	52 (6.2%)
51-60 year	370(7%)	23 (2.7%)
61-70 year	174 (3.3%)	7 (0.8%)
>70 year	56 (1.1%)	0 (0%)
<b>Total</b>	<b>5252</b>	<b>840</b>

Table.1 depicts age wise case distribution where cases were found prevalent among adult age group of 21- 30 years (29.60%).

**Table 2: Sex wise distribution of Patients tested for Dengue Serology. (Jan 2018 - Dec 2020)**

Gender	Total No of cases	Total no of Positive cases
Male	2921 (55.6%)	548 (65.2%)
Female	2331 (44.4%)	292 (34.8%)
<b>Total</b>	<b>5252</b>	<b>840</b>

Table.2 reveals gender wise case distribution, confirmed cases were more in male (65.2%) than female (34.8%).

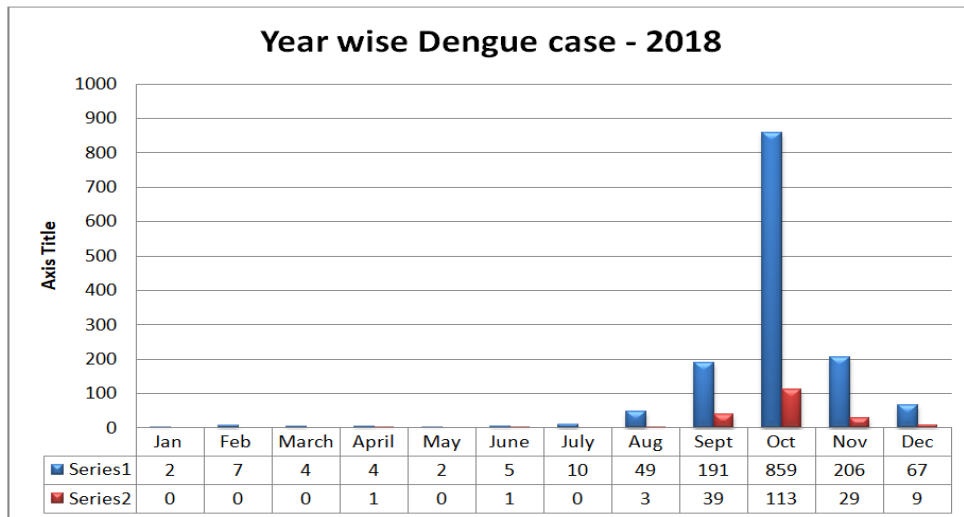
**Table 3: Year wise distribution of Dengue cases:**

Year	Dengue Positive cases	Dengue Negative cases	Total cases
2018	195 (13.9%)	1211 (86.1%)	<b>1406</b>
2019	617 (18.9%)	2647 (81.1%)	<b>3264</b>
2020	28 (4.8%)	554 (95.2%)	<b>582</b>

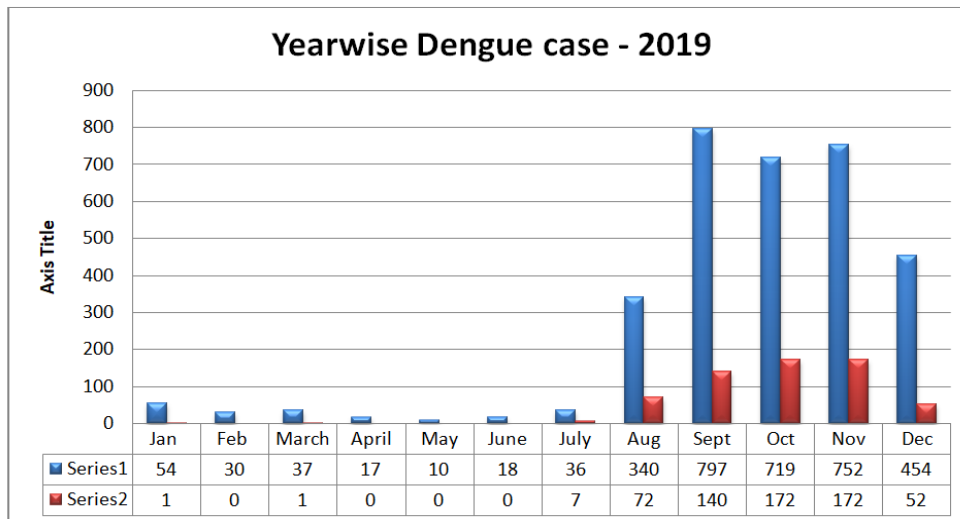
Table 3 depicts year wise case distribution, more number of case were reported in year 2019 (18.90%) followed with 13.90% and 4.80% in year 2018 and 2020 respectively.

**Table 4: Month wise case distribution (2018-2020)**

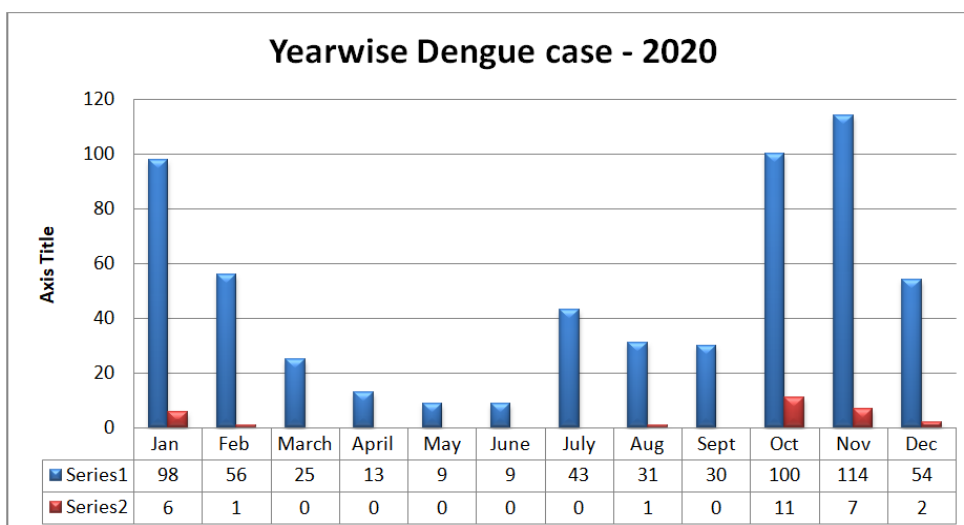
Month	2018		2019		2020	
	Total	Positive	Total	Positive	Total	Positive
Jan	2 (0.1 %)	0 (0 %)	54 (1.6 %)	1 (0.2 %)	98 (16.9 %)	6 (21.4 %)
Feb	7 (0.5 %)	0 (0 %)	30 (0.9 %)	0 (0 %)	56 (9.6 %)	1 (3.6 %)
March	4 (0.3 %)	0 (0 %)	37 (1.1 %)	1 (0.2 %)	25 (4.3 %)	0 (0 %)
April	4 (0.3 %)	1 (0.5 %)	17 (0.5 %)	0 (0 %)	13 (2.2 %)	0 (0 %)
May	2 (0.1 %)	0 (0 %)	10 (0.3 %)	0 (0 %)	9 (1.5 %)	0 (0 %)
June	5 (0.4 %)	1 (0.5 %)	18 (0.6 %)	0 (0 %)	9 (1.5 %)	0 (0 %)
July	10 (0.7 %)	0 (0 %)	36 (1.1 %)	7 (1.1 %)	43 (7.4 %)	0 (0 %)
Aug	49 (3.5 %)	3 (1.5 %)	340 (10.4 %)	72 (11.7 %)	31 (5.3 %)	1 (3.6 %)
Sept	191 (13.6%)	39 (20%)	797 (24.4%)	140 (22.7%)	30 (0.5 %)	0 (0 %)
Oct	859 (61.1%)	113 (58%)	719 (22%)	172 (27.9%)	100 (19 %)	11 (39.3%)
Nov	206 (14.7 %)	29 (14.9 %)	752 (23 %)	172 (27.9%)	114 (19.6 %)	7 (25 %)
Dec	67 (4.8 %)	9 (4.6 %)	454 (13.9 %)	52 (8.4 %)	54 (9.3 %)	2 (7.1 %)
<b>Total</b>	<b>1406</b>	<b>195</b>	<b>3264</b>	<b>617</b>	<b>582</b>	<b>28</b>



**Figure 1: Year wise Dengue case – 2018**



**Figure 2: Year wise Dengue case – 2019**



**Figure 3: Year wise Dengue case - 2020**

Table 4 and Figure 1, 2, & 3 depicts month wise case distribution, more number of cases were reported in the month of September, October and November. However in January 2020 more number of cases were reported.

### Discussion:

Dengue is an emerging modifiable disease of tropical and subtropical area<sup>9</sup>. It is one of those diseases having seasonal outbreak, also having potential to cause life threatening infection globally. Various state of India has reported this outbreak frequently<sup>10</sup>. In present study, a total of 5252 suspected cases of dengue were tested for dengue NS1 antigen by ELISA. Total Dengue confirmed case positivity rate was found as 15.99%. Study conducted by Padbidri et al, 1996 and Lata Patel et al, 2013 showed 15.4% and 16.3% seroprevalence respectively<sup>11,12</sup>. Another study by Parmasivan et al 2006, Nishat et al 2010, Omprakash et al 2015, srinivash et al 2013 and Jhansi et al 2015 from different geographical regions of India have reported a seroprevalence of 20%, 38.90%, 22%, 53.20% and 20.30% respectively<sup>21,22,23,24,25</sup>. The incidence of laboratory confirmed dengue was predominant in adult (29.6%). Sex distribution shows a male preponderance of 55.6% and this finding is in compliance with that of earlier studies<sup>13,14</sup>. In other study by Gupta et al<sup>15</sup> and Kumar et al<sup>16</sup> revealed maximum cases in adult age group of 21-30 Years with male preponderance. The reason could be these young adults are involved in more of outdoor activities, hence more exposed for mosquito bites<sup>17</sup>. Study observed prevalence of dengue infection among male and female to 2:1 ratio which is in concordance with other study<sup>15,16,18,19,20</sup>. In terms of seasonal trend of dengue infection we observed more number of cases in monsoon and post monsoon season (September to November). Earlier study also revealed maximum dengue positive cases from the first week of September to mid of October<sup>17</sup>. This indicates active viral transmission; rainy season is the breeding period of the *Aedes aegypti* mosquito which continuously reproduces until winter season<sup>17</sup>.

### Conclusion

There are tremendous lacunae pertaining to knowledge of dengue epidemiology in India, especially in tribal regions. These lacunae accentuate the need for carrying out community based cohort studies representative of various geographical regions for getting reliable estimate of age specific incidence and complications of dengue. It is also needed to understand studies for getting data regarding dengue seroprevalence in the tribal region of India. In spite of diverse preventive measures undertaken by WHO several new outbreak of dengue infection have been identified during post monsoon season.

To minimize such outbreak newer diagnostic technique, public awareness programme, health education with proper monitoring of vector control is must.

This study also depicts the need for destruction of mosquito breeding places and to strengthen vector control activity during post monsoon season.

### Implications of study:

This study helped -

- To know the prevalence of dengue infection in a geographical area through periodical surveillance programme.
- Clinicians to initiate treatment and appropriate management of dengue infection due to early and accurate diagnosis.
- Proper health education for vector control
- To initiate public health awareness for prevention of Dengue infection

**Limitations:**

Unable to do serotyping to know the prevalent serotype circulating in the concern district due to economical restraints and resource limited setup.

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