

## To study the seroprevalence of dengue in patients attending Kamineni Hospital, Narketpally, Telangana State

<sup>1</sup>Dr. Ajitha Reddy Edula, <sup>2</sup>Dr. GJ Archana, <sup>3</sup>Dr. Patruni Manoj

<sup>1</sup>Assistant Professor of Microbiology, RVM Institute of Medical Sciences and Research Center, Laxmakkapally, Siddipet, Telangana, India

<sup>2</sup>Assistant Professor of Microbiology, Gandhi Medical College and Hospital, Hyderabad, Telangana, India

<sup>3</sup>Assistant Professor, Department of Community Medicine, RVM Institute of Medical Sciences and Research Center, Laxmakkapally, Siddipet, Telangana, India

**Corresponding Author:** Dr. GJ Archana (arky769@gmail.com)

### Abstract

**Introduction:** Dengue is a mosquito-borne viral disease that has rapidly spread in all regions of WHO in recent years. Dengue virus is transmitted by female mosquitoes mainly of the species *Aedes aegypti*. These mosquitoes are also vectors of chikungunya, yellow fever and Zika viruses. Dengue causes a wide spectrum of disease. This can range from subclinical disease (people may not know they are even infected) to severe flu-like symptoms in those infected. Although less common, some people develop severe dengue, which can be any number of complications associated with severe bleeding, organ impairment or plasma leakage. Aims and objectives of this study are to know the prevalence of acute dengue viral infection in cases presenting with clinical features suggestive of Dengue through seroanalysis at Kamineni Hospital, Narketpally, Telangana.

**Materials & Methods:** This study is a hospital based cross-sectional study conducted in the year 2018-2019 in the Department of Microbiology, Kamineni Hospital, Narketpally, Telangana state from August 2018 to March 2019. A total of 120 blood samples collected from patients admitted in Kamineni Hospital with clinical features suggestive of Dengue fever. The serum samples were tested for IgM antibodies for dengue virus by dengue IgM capture ELISA. All the patients' serum samples were tested for dengue IgM antibodies by IgM capture ELISA. This test is a solid phase immunoassay, based on an immunocapture principle.

**Data analysis:** The data was spread over excel sheet and the results were expressed as percentages and represented with tables wherever required.

**Results:** 72 were males and 48 were females, most of the cases were of the 10-20 age group. Most of the cases reported were from the young age groups. 52 samples were positive for IgM antibodies to Dengue. More number of positive cases is among the males. The common clinical features among all the patients admitted was fever (100%) followed by headache (n=96, 80%), arthralgia (n=93=77.5%). The prevalence of dengue was found more among the rural population (n=33, 49.2%) when compared to the urban population (n=19, 35.8%).

**Conclusion:** The prevalence of dengue infection was more among 0-10yrs age group (48.2%). A significant association was observed between dengue seropositivity and the clinical presentation of the study population i.e., hepatosplenomegaly, conjunctival congestion, skin rash, retro bulbar pain and hemorrhagic manifestations.

**Keywords:** IgM antibodies, ELISA, seropositive, urban, rural

### Introduction

Dengue is caused by a virus of the Flaviviridae family and there are four distinct, but closely related, serotypes of the virus that cause dengue (DENV-1, DENV-2, DENV-3 and DENV-4). Severe dengue has a higher risk of death when not managed appropriately. Severe dengue was first recognized in the 1950s during dengue epidemics in the Philippines and Thailand. Today, severe dengue affects most Asian and Latin American countries and has become a leading cause of hospitalization and death among children and adults in these regions. Dengue has distinct epidemiological patterns, associated with the four serotypes of the virus. These can co-circulate within a region, and indeed many countries are hyper-endemic for all four serotypes. Dengue has an alarming impact on both human health and the global and national economies. The incidence of dengue has grown dramatically around the world in recent decades. A vast majority of cases are asymptomatic or mild and self-managed, and hence the actual numbers of dengue cases are under-reported. Many cases are also misdiagnosed as other febrile illnesses<sup>[1]</sup>. Prevalence of dengue estimates that 3.9 billion people are at risk of infection with dengue viruses. Despite a risk of infection existing in 129 countries<sup>[3]</sup>, 70% of the actual burden is in Asia<sup>[2]</sup>. The number of dengue cases reported to WHO increased over 8 fold over the last two decades, from 505,430 cases in 2000, to over 2.4 million in 2010 and 5.2 million in 2019. Reported deaths between the year 2000 and 2015 increased from 960 to 4032. The largest number of dengue cases ever reported globally was in 2019. The global incidence of dengue has grown dramatically in recent decades. About half of the world's population is now at risk. There are an estimated 100-400 million infections each year. Over the past 10-15

years next to diarrheal diseases and respiratory infections, dengue has become a leading cause of hospitalization and deaths, among children in SEAR. The estimated number of annual dengue cases in the region is between 20 to 30 million and dengue hemorrhagic cases about 2 lakhs. The case fatality rates are high in major endemic countries (about 3.5%)<sup>[1]</sup>. Dengue fever is characterized by fever, headache, myalgia, arthralgia, rash, nausea and vomiting affecting mainly younger age group. The presentation of dengue fever varies from asymptomatic to symptomatic. In symptomatic patients it presents as classical dengue fever, dengue hemorrhagic fever or dengue shock syndrome<sup>[1]</sup>. The dengue disease burden in India is poorly quantified<sup>[4]</sup>. Existing public health surveillance systems are not sensitive; mild febrile illnesses are less likely to be diagnosed and reported. The data from the private sector, where most patients seek care, largely remains incomplete. Moreover, surveillance systems are not designed to capture subclinical infections, which account for about 75% of dengue infections<sup>[5]</sup>. No population-based studies have been done that estimates the incidence of dengue in India<sup>[4]</sup>. Well-designed population-based sero-prevalence studies can provide information about dengue burden by age, sex and region. This study is taken to ascertain the prevalence of dengue by sero-diagnosis and observe the geographical and seasonal distribution of dengue virus.

### Materials & Methods

This is a Hospital based cross-sectional study conducted in the year 2018-2019 in the Department of Microbiology, Kamineni Hospital, Narketpally, Telangana state from August 2018 to March 2019. Prior to the study informed consent was taken from all the cases in this

study and institutional ethical committee approval was taken from Kamineni institutional ethics committee. Case History and details were collected through a semi structured questionnaire and also from the case sheets. A total of 120 blood samples collected from patients admitted in Kamineni Hospital with clinical features suggestive of Dengue fever. The serum samples were tested for IgM antibodies for dengue virus by dengue IgM capture ELISA. The blood sample was obtained from the patient by venipuncture following strict aseptic precautions and allowed to clot at room temperature and then centrifuged. The serum was separated. Dengue IgM ELISA is used for qualitative detection of IgM antibodies to dengue antigen in serum. All the patients serum samples were tested for dengue IgM antibodies by IgM capture ELISA. This test is a solid phase immunoassay, based on an immunocapture principle. The data collected was spread over excel sheet and the results were expressed as percentages and represented with tables wherever required.

### Results

**Table 1:** Showing the Age & Gender distribution among the study population

Age	Male	Female	Total
0-10	36	22	58
11-20	18	13	31
21-30	7	3	10
31-40	4	5	9
41-50	3	2	5
51-60	4	3	7
Total	72	48	120

There were 120 patients tested for dengue, 72 were males and 48 were females and most of the cases were of the 0-10 age group. Most of the cases reported were from the young age groups.

**Table 2:** Showing gender versus positivity among the study population

Gender	Total	No of IgM Positive samples
Males	72	33 (45.83%)
Females	48	19 (39.58%)
Total	120	52 (43.33%)

All the 120 cases were tested for IgM antibodies to Dengue virus by ELISA. Of the 120 serum samples tested, 52 samples were positive for IgM antibodies to Dengue. More number of positive cases was observed among the males.

**Table 3:** Showing positivity among age and gender in this study

Age (in years)	Male		Female		Total
	Total no of cases	IgM Positivity	Total no of cases	IgM Positivity	
0-10	36	19(52.77%)	22	9 (40.90%)	58

11-20	18	9 (50%)	13	7(53.84%)	31
21-30	7	3(42.85%)	3	1(33.33%)	10
31-40	4	1(25%)	5	2(40.0%)	9
41-50	3	0	2	0	5
51-60	4	1(25%)	3	0	7
Total	72	33(45.83%)	48	19 (39.58%)	120

Out of 36 males in the age group 0-10 nineteen (52.77%) were Ig M positive for dengue. Of the 22 female in the age group 0-10, nine(40.90%) were IgM positive for dengue. Of the 18 male cases from the age group 11-20yrs nine (50%) were positive for dengue IgM. Similarly out of the 13 female cases of 11-20 group seven (53.84%) were found to be positive for dengue IgM.

**Table 4:** Showing commonest Clinical findings among the study population

Presenting Feature	Total No of cases	Percentage
Fever	120	100.0
Severe headache	96	80.0
Conjunctival congestion	68	56.6
Arthralgia	93	77.5
Retro bulbar pain	68	56.6
Nausea and vomiting	91	75.8
Skin rash	67	55.8
Pain abdomen	76	63.3
Hepatosplenomegaly	54	45.0
Altered sensorium	54	45.0
Hemorrhagic manifestations	22	18.3

The common presenting features in the patients were: fever (100%), mild to severe headache (n=96, 80.0%) and arthralgia (n=93, 77.5%). The other common symptoms were retro bulbar pain, hepatosplenomegaly, conjunctival congestion, nausea and vomiting and skin rash.

**Table 5:** Showing the positivity in relationship with the clinical features among the study population

Presenting Feature	Total No of cases	No of IgM Positive cases
Fever	120	39 (32.5%)
Headache	96	39 (40.6%)
Conjunctival congestion	68	42 (61.7%)
Arthralgia	93	39 (41.9%)
Retrobulbar pain	68	44 (64.7%)
Nausea and vomiting	91	31 (34.0%)
Skin rash	67	36 (53.7%)
Pain abdomen	76	38 (50.0%)
Hepatosplenomegaly	54	39 (72.2%)
Altered sensorium	54	24 (44.4%)
Hemorrhagic manifestations	22	10 (45.4%)

The observations in this study was that the hepatosplenomegaly was common clinical feature with positivity of 72.2% IgM positivity, followed by retro bulbar pain and conjunctival congestion, skin rash and pain abdomen.

**Table 6:** Distribution of cases as rural versus urban

	Total no of cases	IgM Positive
Urban	53	19 (35.8%)
Rural	67	33 (49.2%)
Total	120	52

The prevalence of dengue was high among the rural population (n=67, 49.2%) when compared to the urban population (n=53, 35.8%).

## Discussion

Dengue is an acute arboviral disease. It is probably one of the most important viral diseases in terms of human morbidity and mortality. Rapid industrial and economic development over the past two decades has brought

about massive infrastructural development both in housing and commercial sectors. Large scale rural-urban migration has created slum settlements where inadequate water and sanitation facilities and poor solid-waste management have resulted in the creation of breeding sites for *Aedes aegypti*. Tropical rainfall provides additional *Aedes* breeding sites and favorable temperature and humidity results in the rise of dengue transmission. Other risk factors are globalization, trade and commerce have facilitated introduction of different strains of all the four dengue virus serotypes in India. Vaccines or antiviral drugs are not available for dengue viruses. The only effective way to prevent epidemic dengue fever/ dengue hemorrhagic fever and dengue shock syndrome is to control the vector (mosquito) and prevent its bite.

The present study was conducted on 120 cases presenting with suspected dengue fever admitted at Kamineni Hospital, Hyderabad from August 2018 to March 2019. Among the 120 patients tested, 52 (43.33%) were found to be positive for IgM antibodies to Dengue by IgM capture ELISA method. Among the 120 cases 72 (60%) were males, 48 (40%) are females. 58 cases belonged to the 0-10 age group and among them 28 were positive (48.27%). In the present study, the ratio of the positive cases among the males and female was 1.7:0.6. Similar results were found in studies conducted Gerardo Chowell (30%) *et al.*,<sup>[6]</sup> and Ira Shah (48.44%) *et al.*,<sup>[7]</sup>, S.Khanna (55%) *et al.*,<sup>[8]</sup> and S.L.Hoti (50.6%) *et al.*,<sup>[9]</sup>.

In a study conducted by Ira Sha *et al.*,<sup>[7]</sup> the mean age of presentation was 6.1 years. In another study by S.L.Hotie *et al.*,<sup>[9]</sup> 1-15 years old children were most affected. In the present study most of the reported cases were from younger age group 0-10 yrs. These were the people who were active outdoors, whether working, schooling or playing outside their homes. *A.aegypti* is a day biter with increased biting activity 2 hours after sunrise and early hours of evening.

Farid Uddin Ahmed *et al.*,<sup>[10]</sup> studied about the incidence of Dengue and Dengue hemorrhagic fever in 73 children admitted at Chittagong Medical College Hospital, Bangladesh. The mean age affected was 8.4 years, affecting mostly the children of 5-9 years age. 26 children were positive (36%) for dengue fever. G.Rajendran (ICMR-Pondicherry) *et al.*,<sup>[11]</sup> conducted a study in Sulerpet, Andhra Pradesh, India and found 22.9% cases were positive for dengue IgM antibodies, of which 34.6% were children.

In the present study the seropositivity for dengue fever was 43.33%. Among the males, 33 out of 72 were positive for IgM dengue (45.83%) and among the females 19 were positive out of 48 (39.58%). The incidence of dengue was more in males (60%) than in females (40%). The incidence was high in males (n=72), because they go for outdoor work and they are more exposed to the bite of *Aedes aegypti*. A significant difference between the male and female groups was noted by EngEongOoi *et al.*,<sup>[12]</sup> males were affected more than females (1.6:1). But their study population was predominantly of adults. In a similar study conducted by Siraporn Sawasdivornet *et al.*,<sup>[13]</sup> concluded that the male to female ratio in their study was 1.4 to 1. Their study population was predominantly of younger age group (1-13 years).

In the present study the most common clinical presentation was fever (100%). There was also a high incidence of headache, nausea, vomiting, myalgia and rash. It was also observed in this study that the cases presenting with hemorrhagic manifestations, retro bulbar pain and altered sensorium showed concordance with IgM seropositivity for dengue. Similar observations were made in a study conducted by G.M.Malavige, P.K.Ranatunga *et al.*,<sup>[14]</sup> in 2007.

Ira shah and Bhushan Katira *et al.*, in a study in Mumbai, screened 69 suspected cases of dengue and 34 cases were positive for dengue IgM. The most common clinical presentations were fever (100%), vomiting (95.5%), rash (14.7%) and hepatomegaly (47.1%). Rachel Daniele *et al.*,<sup>[15]</sup> studied 250 cases which were IgM dengue antibody confirmed cases

admitted to the three major hospitals in Kollam dist in Kerala. The most common presenting symptoms were fever (96.8%), headache (77.2%), abdominal pain (62.4%), diarrhea (15.2%), bleeding tendencies (15.2%), skin rash (13.2%).

S.Khanna *et al.*, studied patients with febrile illness with clinical features suggestive of Dengue in New Delhi. Their study populations consisted of 100 cases. The most common clinical features observed by them were fever (100%), headache (73.3%), retroorbital pain (46.6%) and hepatomegaly (23.3%). S L Hotie *et al.*, of Indian Council of Medical Research, Pondicherry conducted a study on the 92 cases. Most of the cases were of 1-15 years age group and of the 92 samples screened, 79 were positive for Dengue IgG/IgM, but only 50.6% showed positive in IgM testing. Fever was the most common clinical presentation followed by mayalgia, hemorrhage, hepatomegaly, shock and convulsions.

## Conclusion

The isolation of dengue viruses or demonstration of dengue viral genome sequences is useful for confirmation of dengue virus infection. These tests are only available in reference laboratories. The detection of IgM by capture ELISA is helpful for the diagnosis of acute dengue virus infection. The serological diagnosis of dengue fever has a role in categorizing primary and secondary infection and it also serves as a predictor of disease progression and mortality especially in the sever forms i.e. dengue hemorrhagic fever/dengue shock syndrome. Early detection of cases helps the public health authorities to take appropriate control measures to prevent the spread of the disease and also helps in the early management of cases.

**Conflict of interest:** None to declare.

**Funding:** Nil.

### References

1. Waggoner JJ, *et al.*, Viremia and Clinical Presentation in Nicaraguan Patients Infected With Zika Virus, Chikungunya Virus and Dengue Virus. *Clinical Infectious Diseases*. 2016; 63(12):1584-1590.
2. Bhatt S, *et al.*, The global distribution and burden of dengue. *Nature*. 2013; 496(7446):504-507.
3. Brady OJ, *et al.*, Refining the global spatial limits of dengue virus transmission by evidence-based consensus. *PLOS Neglected Tropical Diseases*. 2012; 6(8):e17-60.
4. Ganeshkumar P, Murhekar MV, Poornima V *et al.*, Dengue infection in India: a systematic review and meta-analysis. *PLoS Negl Trop Dis*. 2018; 12:e000-6618.
5. WHO-Informing vaccination programs: a guide to the design and conduct of dengue serosurveys. Geneva: World Health Organization. <https://apps.who.int/iris/bitstream/handle/10665/252850/9789241512589>. Date: 2017. Date accessed: April 30, 2019.
6. Gerardo Chowell, Porfirio Diaz-Duenas, Diego Chowell, Sarah Hews, Gabriel Ceja-Espiritu, James M Hyman *et al.* Clinical diagnostic delays and epidemiology of Dengue fever during outbreak in Colima, Mexico, 2002.
7. Ira Shah, Bhushan Katira. Clinical and Laboratory Abnormalities due to dengue in Hospitalized children in Mumbai, 2004.
8. Khanna S, Vij JC, Kumar A, Singal D, Tandon R. Etiology of abdominal pain in dengue fever, 2003-4.
9. Hoti SL, Soundravally R, Rajendran G, Das LK, Ravi R, Das PK. Dengue and Dengue Haemorrhagic fever outbreak in Pondicherry, South India, during 2003-2004, Emergence of DENV-3.
10. Farid Uddin Ahmed, Chowdhury B Mahmood, Jhuloan Das Sharma, Syed Mesbahul Hoque, Rebecca Zaman, Shameem Hasan M. Dengue and Dengue Hemorrhagic Fever in Children During the 2000 Outbreak in Chittagong, Bangladesh, *Dengue Bulletin*, 2001, 25.
11. Rajendran G, Dominic Amalraj, Das LK, Ravi R, Das PK. Epidemiological and Environmental Investigation of DF in Sullurpet, Andhra Pradesh, India, 2000.
12. Eng Eong Ooi. Changing pattern of Dengue transmission in Singapore. *Dengue Bulletin*, 2001, 25.
13. Siraporn Sawasdivorn, Sasitorn Vibulvattanakit, Malee Sasavatpakdee, Sophon Lamisirithavorn. Efficacy of clinical Diagnosis of Dengue Fever in Paediatric Age Groups as Determined by WHO Case Definition 1997 in Thailand, *Dengue Bulletin*, 2001, 25.
14. Malavige GM, Ranatunga PK, Jayaratne SD, Wijesiriwardana B, Seneviratne SL *et al.*, Dengue viral infections as a cause of Encephalopathy. *IJMM*. 2007; 25(2):143-5.
15. Rachel Daniel, Rajamohanam, Aby Zachariah Philip. A study of clinical profile of Dengue fever in Kollam, Kerala, India, 2003.