

## POINT PREVALENCE OF PAEDIATRIC DENGUE VIRAL INFECTION

PUSAPATI SUCHITRA<sup>1</sup>, AMARTHYA SRV<sup>2</sup>, I. JYOTHI PADMAJA<sup>3</sup>, PAYALA VIJAYALAKSHMI<sup>4\*</sup>

<sup>1</sup>Department of Paediatrics, GITAM Institute of Medical Sciences and Research, GITAM Deemed to be University, Rushikonda, Visakhapatnam 530045, Andhra Pradesh, India, <sup>2</sup>GITAM School of Sciences, GITAM Deemed to be University, Rushikonda, Visakhapatnam 530045, Andhra Pradesh, India, <sup>3</sup>Department of Microbiology, GITAM Institute of Medical Sciences and Research, GITAM Deemed to be University, Rushikonda, Visakhapatnam 530045, Andhra Pradesh, India, <sup>4</sup>Department of Microbiology, GITAM Institute of Medical Sciences and Research, GITAM Deemed to be University, Rushikonda, Visakhapatnam 530045, Andhra Pradesh, India  
Email: bavisettyvijayalakshmi2@gmail.com

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### ABSTRACT

**Objective:** The study's objective is to evaluate the prevalence of dengue in the paediatric age group based on demographic data and clinical symptoms.

**Methods:** The study was conducted in the Department of Paediatrics and Central Research Laboratory in a Tertiary Care Hospital in Visakhapatnam. Six months of data were collected from Jan 2022 to June 2022 and a maximum of 100 OPD/IPD cases have been registered during this study period. The entire medical history of all dengue cases, including signs and symptoms, method of diagnosis, management, length of stay, and clinical outcomes, were collected from patient information. NS<sub>1</sub> antigen detection was performed by rapid test and Dengue ELISA was performed as a confirmatory test for the detection of IgG and IgM antibodies.

**Results:** Among the 100 suspected cases of dengue reported to OPD/IPD, 83(83%) were confirmed as dengue positive, and 17(17%) were found to be non-dengue cases with ELISA. More cases were noticed in female children 52 (55%). Prevalence was more in the age group of 5-11 y 43 (52%). The majority number of cases were reported with fever 82 (98.8%) followed by symptoms like vomiting 41(49%), cold 19(16%), and cough 18(15%).

**Conclusion:** Understanding dengue fever in children, including clinical symptoms, etiology, diagnostic testing, therapy, and prevention, is critical for lowering disease fatality rates.

**Keywords:** Dengue, ELISA, Prevalence, Paediatric age group

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### INTRODUCTION

Dengue viruses belong to the Flavivirus genus, which belongs to Flaviviridae family. Ren Kimura and Susumu Hotta initially recognized the dengue virus in 1943 [1]. These two specialists examined blood samples taken from patients during the 1943 dengue outbreak in Nagasaki, Japan [1]. Since 2010, dengue fever has become more prevalent in various states, with an annual incidence of almost 15 million people [2]. According to the NVBDCP 2021 [3], India sees roughly 100 000 illnesses and 200–400 fatalities per year [3]. The four closely related viruses that cause dengue fever are DEN-1, DEN-2, DEN-3, and DEN-4. Because of the various ways that these four viruses interact with the antibodies present in human blood serum, they are referred to as serotypes [3]. Despite genetic variation even within a single serotype, the four dengue viruses are similar in that they share about 65% of their genomes [4]. Regardless of these variations, all dengue serotype infections result in the same illness and symptoms [4]. The viral disease dengue fever, carried by mosquitoes, is a severe global public health concern. The principal means of transmission from one person to another is the mosquito *Aedes aegypti*, which bites during the day, is adapted to human environments, and favors human blood meals. Over a billion individuals in more than a hundred countries are at risk from dengue illness [5]. Any of the four serotypes of the dengue virus can cause this systemic febrile illness, which has viremia, fever, rash, headache, muscle and joint pain, and other symptoms. Frequent febrile seizures and dehydration are typical of dengue fever's most common medical consequences. Capillary leakage, hemorrhagic signs, and, in severe cases, hypovolemic shock are the hallmarks of dengue haemorrhagic fever (DHF), a potentially fatal illness [6, 7]. Treatment of dengue fever focuses on reducing pain sensations, controlling a fever, warning patients that NSAIDs may increase the risk of bleeding, and urging them to drink more water,

especially if their temperature is high [8]. Watch for warning signs of severe dengue and begin treatment as soon as possible to minimize consequences, including prolonged shock and metabolic acidosis. Healthcare professionals should be taught how to spot this problem early [9]. Acetaminophen should be administered to patients to relieve pain and fever. Aspirin and non-steroidal anti-inflammatory drugs may make some dengue infections more likely to cause bleeding, which might cause Reyes syndrome in children [1]. Despite the significant prevalence of dengue-related illnesses, there is no widely applicable vaccine or authorized antiviral medication to treat or prevent dengue virus infection. In the last decade, many antiviral compounds have been identified, but only a few have been further evaluated in pre-clinical or clinical trials. To study the prevalence of Dengue viral infection in the Pediatric age group based on demographic data and clinical symptoms.

### METHODS AND MATERIALS

#### Study design

It is a retrospective study conducted in the Department of Paediatrics in GIMSR hospital, Visakhapatnam, from Jan 2022 to June 2022.

#### Inclusion criteria

- Age: varied from 6 mo to 14 y
- Children presented with dengue fever to OPD and suspected cases of dengue

#### Exclusion criteria

- Febrile cases with other proven etiology (malaria, typhoid upper respiratory tract infections)
- Negative cases for dengue serology.

- Cases with any co-morbidity that may alter the laboratory and clinical findings, such as other viral infections.

### Study population

A total of 100 recorded OPD/IPD cases were taken into the study for five months. Data regarding most common clinical signs and symptoms like fever, arthralgia, myalgia, headache, body aches, skin rash, bleeding manifestations, and gastrointestinal (GI) symptoms like vomiting and pain abdomen were noted. The study reviewed the clinical, laboratory, treatment, and outcome data of 100 children (6 mo to 14 y of age) admitted to the hospital with fever and a suspected diagnosis of dengue. Complete medical records of all dengue cases, including signs and symptoms, method of diagnosis, management, duration of stay, and clinical outcome, were retrieved from the patient's information reports.

### Methodology

The study included children (<14 y of age) serologically diagnosed as dengue-positive at the time of admission using the dengue IgM-specific antibodies ELISAs (Panbio® Dengue IgM capture ELISA, Alere TM, Australia). According to the WHO recommendations (2022), all cases were classified clinically as severe dengue, DS, and DWS. Children with confirmed dengue diagnosis (tested positive for IgM ELISA) were regarded to be in the dengue-positive group with IgM ELISA titer values of >11 Pan-Bio Units (PBU), whereas the others were grouped as having non-dengue fever/other febrile illnesses (9 PBU) and having equivocal dengue. Antihuman IgM (chain specific) coated on the solid surface binds to IgM antibodies in the patient's serum (wells). The dengue antigen is then introduced and attached to the human IgM present in the sample to capture it. During the washing process, the unbound antigen is eliminated. Following the addition of Avidin-HRP, biotinylated Flavivirus anti-DEN monoclonal antibodies are added. Chromogenic substrate (TMB/H<sub>2</sub>O<sub>2</sub>) is then introduced. By using 1N H<sub>2</sub>SO<sub>4</sub>, the reaction is stopped. At 450 nm, the optical density is quantified. A positive test indicates an active primary or secondary dengue infection. The Department of Microbiology measured optical density (OD) at 450

nm using the ELISA reader method, and test results were classified as either positive, negative, or equivocal in accordance with the manufacturer's instructions. According to the manufacturer, the sensitivity and specificity of detection were 94.7% and 100%, respectively—this diagnostic kit allowed for the qualitative identification of dengue-specific IgM antibodies in human serum.

### RESULTS

After enrolment, baseline information, including demographic characteristics, clinical history, examination findings, and the outcome, was documented using a structured case report form. Among the 100 suspected cases of dengue reported to OPD/IPD, 83% were confirmed as dengue positive, and 17% were found non-dengue cases. By studying the influence of demographic variable age on the prevalence of dengue viral infection, it was observed that the majority were in the age group 5-11 years, with the total cases reported being 43 (52%) followed by 1-5 y 22 (27%) cases, 11-14 y 16 (20%) and less than one year age 2 (1%). By Gender wise distribution of dengue-positive cases, more cases were noticed in females 52 (55%) than in males 48 (45%). Among the 83 positive cases of dengue, more cases were reported with fever 82 (98.8%), followed by other symptoms like vomiting 41 (49%), cold 19 (16%), cough 18 (15%) and headache with body pains 26 (32%) (table 1). The results also found that more dengue-positive cases were reported from urban areas, 48 (58%) than rural areas, 35 (42%) (table 2). Using ELISA, out of the 100 reported cases, 83 were confirmed as dengue positive, and 17 were found as non-dengue. Most of the reported cases at the time of admission had more than one lakh platelet count, and very few cases were recorded in the range of 21,000 to 1 00,000 platelet count (table 3). Platelet transfusion was done in 11% of dengue cases. The mean values of biochemical parameters of 100 samples were Haemoglobin levels (11.95%), PCV (35.05%), Total cell count (5288/mm<sup>3</sup>), and the CRP rate was 24 mg/dl in 4 cases, 48 mg/dL in 10 cases and 96 mg/dL in two patients. The duration of hospital stay was in between 5-11 d among the all reported cases. All the cases were discharged with no signs of dengue symptoms.

Table 1: Clinical characteristics of the study

S. No.	Signs and symptoms	Dengue (N=83)		Non-dengue (N=17)	
		Positive	Negative	Positive	Negative
1	Fever	82	1	17	0
2	Cold	19	64	6	11
3	Cough	18	65	5	12
4	Headache	12	71	2	15
5	Vomiting	41	42	7	10
6	Body Pains	14	69	2	15

Table 2: Area distribution of the study

Area	Dengue (N=83)	Non-dengue (N=17)
Urban	48	7
Rural	35	10

Table 3: Platelet count of study

Age group (Years)	Total number of cases (N=83)	Platelet count/mm <sup>3</sup>			
		<20,000	21,000-50,000	51,000-1,00,000	>1,00,000
<1	2	0	0	0	2
1-5	22	0	2	7	13
5-11	43	0	13	7	23
11-14	16	0	5	5	6

### DISCUSSION

The most diverse presentation in dengue can appear as a self-resolving fever or a dengue shock syndrome [10]. The associated morbidity and mortality are decreased by early detection and treatment. This study, which includes children aged 6 mo to 14 y, is

attempted to retrospectively examine the numerous demographic and clinical parameters linked to dengue fever in children. The author discovered that infants had a lower incidence of dengue compared to other age groups. The age group from 5 to 11 y had the highest incidence, followed by that from 11 to 14 y. In general, these age groups are more exposed to the outside world. The highest

incidence was discovered in the 1 to 5-year age group in the study of Padmanabhan *et al.* (2018) [11], followed by the 11 to 14 y age group. According to Mital *et al.* (2016) [12], 11 to 20 y had the highest frequency. The age range of 11 to 15 y was shown to have the highest frequency by Vazhayil *et al.* (2017) [13]. In this study, the incidence of dengue fever was 55% more common in women. In their research, Padhi *et al.* (2014) [14] found that females were more likely to contract dengue than males. In the present study, fever was present in all cases 100%, and vomiting was the most commonly associated symptom (49%), followed by cold (16%), cough (15%), and headache (32%). Fever was the most common symptom in a study by Vazhayil *et al.* (2017) [13], followed by vomiting, headache, myalgia, stomach discomfort, petechial rash, and Malena. Fever was present in all instances in a study by Alok Kumar *et al.* (2017) [15], and the following symptoms were linked to it in decreasing order of incidence: vomiting, respiratory distress, weakness, abdominal pain, myalgia, and rashes. In a study conducted by Arun *et al.* (2017) [16], there was an elevated incidence of neurological signs in many of the reported dengue patients, which was not seen in the current investigation. According to this study, dengue fever affects rural people more frequently than urban ones. IgM and IgG testing, as well as a rapid test for NS1 antigen detection, can be used to diagnose dengue. Out of the 100 reported cases, 83 were determined to be seropositive for dengue, whereas 17 were found to be seronegative for the disease. Twenty patients were reported with low platelet counts between 21,000 to 50,000/mm<sup>3</sup>, and platelet transfusion was done in 11% of dengue cases. The results were similar to the findings reported by Khan *et al.* (2021) [17] showed platelet count < 50,000/mm<sup>3</sup> in a few of the reported cases.

## CONCLUSION

The present study retrospectively analyzed all the typical and atypical presentations, epidemiological data, and investigations of dengue in the paediatric age group. This study will give a clear insight into the prevalence of dengue in children, the disease symptoms, and the outcome. Fever and GI symptoms are most commonly presented in the current study population by the results of past literature. Understanding dengue in children, including its clinical manifestations, pathogenesis, diagnostic tests, management, and prevention, is very important to reduce mortality.

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Nil

## AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

## CONFLICT OF INTERESTS

Declared none

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