

## Original Research Article

# PREVALENCE AND SEASONAL TRENDS OF DENGUE INFECTION

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## ABSTRACT

**Background:** Dengue fever is a viral illness transmitted by mosquitoes, primarily affecting populations in tropical and subtropical regions. The disease displays a marked seasonal trend and can present with a wide clinical spectrum, ranging from mild or asymptomatic cases to more severe manifestations like dengue hemorrhagic fever (DHF) and potentially progressing to dengue shock syndrome (DSS). Globally, it is estimated that dengue causes between 58.4 and 96 million symptomatic infections each year.

**Materials and Methods:** Patients of all ages and sexes with clinical features suggestive of dengue, including DSS/DHF, were included in the study. A total of 1,400 serum samples were collected from individuals with symptoms such as fever, headache, myalgia, arthralgia, rash, or bleeding. Both inpatients and outpatients aged 3 to 87 years were included. Approximately 2–3 ml of blood was drawn under aseptic conditions, allowed to clot, centrifuged, and the serum was tested for NS1, IgM, and IgG using Platelia Dengue NS1 Ag (Bio-Rad) and Ultra Dengue IgM/IgG ELISA kits (SD Biosensor) as per manufacturer instructions.

**Results:** Out of 1,400 suspected cases of dengue, 328 (23.4%) were confirmed positive, while 1,072 (76.6%) tested negative. Among the seropositive cases, the most frequently observed marker combination was NS1 and IgM (129 cases, 39.3%), followed by NS1 alone (76 cases, 23.2%), IgM alone (58 cases, 17.7%), IgG alone (45 cases, 13.7%), and a combination of IgG and IgM (20 cases, 6.1%). A distinct seasonal trend was noted, with the majority of positive cases (278, or 84.8%) occurring during the monsoon season, compared to 50 cases (15.2%) during other times of the year.

**Conclusion:** This study highlights the importance of understanding dengue seroprevalence patterns for improving disease surveillance, enabling timely and accurate clinical diagnosis, and implementing effective vector control strategies.

**Keywords:** Dengue fever, Dengue shock syndrome, Dengue hemorrhagic fever, Seroprevalence

## INTRODUCTION

Dengue virus is a positive-sense, single-stranded RNA virus that belongs to the Flavivirus genus of the Flaviviridae family. Dengue fever is an acute, mosquito-borne viral disease that occurs predominantly in tropical and subtropical regions and exhibits seasonal patterns. It can range in severity from mild or asymptomatic cases to severe forms such as dengue hemorrhagic fever (DHF), with or without progression to dengue shock syndrome (DSS). Globally, it is estimated that there

are between 58.4 and 96 million symptomatic dengue infections annually.<sup>[1]</sup> Between 2009 and 2017, India recorded 683,545 dengue cases and 2,576 related deaths according to data from the National Vector Borne Disease Control Programme.<sup>[2]</sup> The case fatality rate has remained above 1% over the past decade.<sup>[3]</sup>

There are five serotypes of the dengue virus, and immunity acquired is specific to each serotype.<sup>[5]</sup> All five serotypes have been implicated in periodic outbreaks in India. Transmission occurs mainly through the bite of infected *Aedes aegypti*

mosquitoes, and less frequently via *Aedes albopictus*.<sup>[5]</sup> Among the four antigenically distinct dengue virus serotypes (DENV-1 to DENV-4), DENV-2 was responsible for India's largest recorded outbreak in 1996.<sup>4</sup> Later, DENV-3 became predominant in 2003, followed by mixed infections involving DENV-1, 2, and 3 in subsequent years.<sup>[5]</sup> Dengue remains a significant public health challenge in terms of both morbidity and mortality.<sup>6</sup> It is endemic in various parts of India.<sup>[5]</sup> The first documented outbreak resembling dengue occurred in Chennai in 1780, while the first virologically confirmed epidemic was reported in Kolkata and along India's eastern coast during 1963–1964.<sup>[7]</sup> Infant cases of DHF/DSS were first noted in 1970. Severe dengue cases in Asian countries continue to show a high fatality rate. Dengue fever is typically a self-limiting illness often referred to as "break-bone fever" due to the intense body pain it causes. Its incubation period ranges from 3 to 7 days following the bite of an infected mosquito. While some cases remain asymptomatic, many present with classical symptoms such as high-grade fever, headache, retro-orbital pain, myalgia, arthralgia, rash, vomiting, muscle and joint pain, and bleeding manifestations. Recovery usually occurs within two to seven days. In some individuals, especially those experiencing a secondary infection, the disease can progress to DHF or DSS.<sup>[8]</sup> The aim of this study was to assess the seroprevalence of dengue fever in a tertiary care hospital.

## MATERIALS AND METHODS

**Material & Method** The total population of study was 1400. The duration of study was over a period of 2 year.

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**Study population:** The total population of study was 1400.

**Study Area:** This study was conducted in association of Medienn Diagnostics Pvt. Ltd.

### Data Collection:

The patients with clinical feature suggestive of dengue fever and DSS/DHF cases irrespective of their age and sex were included in this study. A total of 1400 serum samples from suspected dengue fever cases were collected from patients with acute febrile illness, headache, myalgia, arthralgia, rashes and bleeding tendencies under aseptic precautions. Study group included both inpatients and outpatients belonging to age group 3 to 87 years. A single blood sample (approximately 2-3 ml) was collected from clinically suspected patients by venepuncture according to the Clinical and Laboratory Standards Institute (CLSI) standard protocol and allowed to clot at room temperature. Samples were then

centrifuged, serum separated, and subjected for NSI, IgM, and IgG assay by Platelia Dengue NSI Ag-Biorad, Ultra Dengue IgM Capture ELISA by SD Biosensor & Ultra Dengue IgG Capture ELISA by SD Biosensor. The tests were done according to the manufacturers guidelines and results were recorded.

**Data Analysis:** Data were analyzed by using Microsoft Excel.

## RESULTS

Out of a total of 1400 suspected dengue cases, 328 (23.4%) were confirmed positive, while 1072 (76.6%) tested negative. Among the 328 positive cases, females (213 cases, 64.9%) outnumbered males (115 cases, 35.1%). The age distribution showed the highest number of positive cases in the 31–40, 41–50, and above 50 age groups (each around 20%), followed by those aged 11–20 (14.9%), 21–30 (14.3%), and 0–10 years (10%). In terms of dengue seropositivity, the most common marker combination was NSI & IgM (129 cases, 39.3%), followed by NSI alone (76 cases, 23.2%), IgM alone (58 cases, 17.7%), IgG alone (45 cases, 13.7%), and combined IgG & IgM (20 cases, 6.1%). Seasonally, dengue positivity peaked during the monsoon, accounting for 278 cases (84.8%), with only 50 cases (15.2%) detected in other seasons.

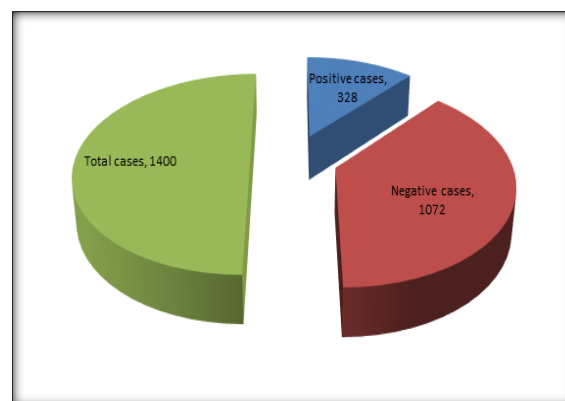


Figure 1

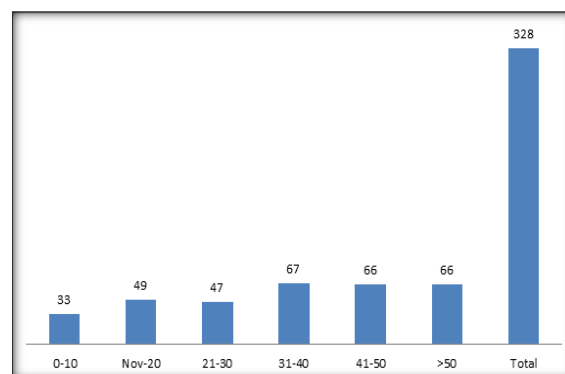


Figure 2

**Table 1: Distribution of cases according to positive and negative cases**

Cases	Number	Percentage
Positive cases	328	23.5%
Negative cases	1072	76.5%
Total cases	1400	100%

**Table 2: Distribution of cases according to Gender**

Gender	Number	Percentage
Male	115	35.1%
Female	213	64.9%
Total	328	100%

**Table 3: Distribution of cases according to Age group**

Age Group	Number	Percentage
0-10	33	10.1%
11-20	49	14.9%
21-30	47	14.3%
31-40	67	20.4%
41-50	66	20.1%
>50	66	20.1%
Total	328	100%

**Table 4: Distribution of cases according to Dengue seropositivity**

Dengue seropositivity	Number	Percentage
NSI Positive	76	23.1%
NSI & IgM Positive	129	39.3%
IgG positive	45	13.7%
IgM Positive	58	17.6%
IgG, IgM Positive	20	6.1%
Total	328	100%

**Table 5: Distribution of cases according to Season**

Season	Positive cases	Percentage
Monsoon	278	84.7%
Other	50	15.3%
Total	328	100%

## DISCUSSION

The present study aimed to evaluate the seroprevalence of dengue fever among patients attending a tertiary care hospital. Out of 1400 cases tested, 328 (23.4%) were found to be seropositive for dengue, highlighting a significant disease burden within the studied population. This seroprevalence is consistent with previous reports from endemic regions in India, where dengue continues to pose a major public health challenge, especially during the monsoon season.

Gender-wise distribution revealed a higher number of female cases (65%) compared to males (35%). While some studies report a male predominance due to higher outdoor exposure, our findings may reflect healthcare-seeking behavior or local epidemiological trends. Age-wise, the majority of dengue-positive cases fell in the 31–50 years age group, accounting for approximately 40.5% of the total positives. This suggests that dengue significantly affects the economically productive population, echoing findings from other regional studies.<sup>[9,10]</sup>

Serological analysis showed varied patterns of positivity. NSI antigen, a marker of early infection, was detected in 76 (23.2%) patients, while the combination of NSI and IgM was the most

prevalent (39.3%). These findings underscore the importance of using a combination of diagnostic tests to improve sensitivity, especially in the acute phase of infection. Notably, IgG positivity (13.7%) may indicate secondary infections or past exposure, which is concerning as secondary dengue infections are associated with a higher risk of severe disease due to antibody-dependent enhancement.<sup>[11]</sup>

Seasonal distribution revealed a sharp spike in seropositive cases during the monsoon season (84.7%), correlating with increased mosquito breeding due to stagnant water. This pattern is well documented in the literature and highlights the need for strengthened vector control measures during the pre- and post-monsoon periods.<sup>[12]</sup>

Overall, this study provides valuable insight into the epidemiology of dengue fever in a tertiary care setting. The high seroprevalence, particularly among adults during the monsoon season, emphasizes the need for robust surveillance, early diagnostic interventions, and public health education. Future research should explore long-term trends and integrate molecular typing to better understand the circulating dengue virus serotypes in the region.

## CONCLUSION

Dengue fever continues to pose a major public health challenge, particularly in tropical and

subtropical regions like India, where all five serotypes circulate and contribute to recurrent outbreaks. The disease exhibits a wide clinical spectrum from asymptomatic infections to life-threatening complications such as DHF and DSS, particularly during secondary infections. Historical and current data indicate a persistent burden with significant morbidity and mortality. Understanding the seroprevalence patterns of dengue, as assessed in this study, is essential for effective surveillance, timely clinical diagnosis, and targeted vector control strategies. Strengthening public health interventions and improving awareness can help mitigate the impact of dengue in endemic areas.

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