



SEROPREVALENCE OF DENGUE VIRUS AMONG PATIENTS ATTENDING A TERTIARY CARE HOSPITAL IN UTTAR PRADESH, INDIA – A COMPREHENSIVE ANALYSIS

Ramendra Pratap Singh¹, Sameena Jawaid², Rajesh Kumar³, Jyoti Srivastava^{4*},
Anjali Agarwal⁵

¹Junior Resident, Department of Microbiology, Hind Institute of Medical Sciences, Barabanki (U.P.), India

²Associate Professor, Department of Microbiology, Hind Institute of Medical Sciences, Barabanki (U.P.), India

³Associate Professor, Department of Microbiology, Hind Institute of Medical Sciences, Barabanki (U.P.), India

^{4*}Professor and Head, Department of Microbiology, Hind Institute of Medical Sciences, Barabanki (U.P.), India

⁵Professor Department of Microbiology, Hind Institute of Medical Sciences, Barabanki (U.P.), India

ABSTRACT

Background: Dengue virus infection is an emerging public health concern in India, representing one of the most common arboviral infections transmitted by *Aedes* mosquitoes. The infection's epidemiology has evolved significantly over the past two decades, with increasing frequency, geographic expansion, and severity of outbreaks¹. This study aims to assess the seroprevalence of dengue virus infection among patients attending a tertiary care hospital in Barabanki, Uttar Pradesh, India, using both Immunochromatographic Test (ICT) and Enzyme-Linked Immunosorbent Assay (ELISA), and to contextualize findings within the framework of prior regional and national studies. **Materials and Methods:** This hospital-based cross-sectional study was conducted in the Department of Microbiology, Hind Institute of Medical Sciences, Barabanki, between August and December 2023. A total of 431 clinically suspected dengue cases were screened using NS1 antigen and IgM antibody ICT kits. All positive samples and a representative subset of negatives were confirmed using ELISA. Demographic data, seasonal trends, and test-wise comparisons were analyzed descriptively. **Results:** Out of 431 sera tested, 130 (30.16%) were positive for NS1 antigen and 100 (23.2%) positive for IgM antibody by ELISA, whereas ICT detected 100 (23.2%) NS1 positives and 50 (11.6%) IgM positives. The majority of cases occurred in 21–40-year-olds (29.6%), with males (66.15%) more affected than females (33.84%). The highest incidence was observed during September and October, coinciding with the post-monsoon season. **Conclusion:** The study confirms a high seroprevalence of dengue infection in Barabanki, comparable with national averages. The findings highlight the predominance of young adult males and the post-monsoon season as a critical period for transmission. Enhanced surveillance, integrated vector management, and use of ELISA-based diagnostic confirmation are vital to control dengue outbreaks effectively.

Keywords: Dengue like illness, Seroprevalence, ELISA, Rapid card test

INTRODUCTION

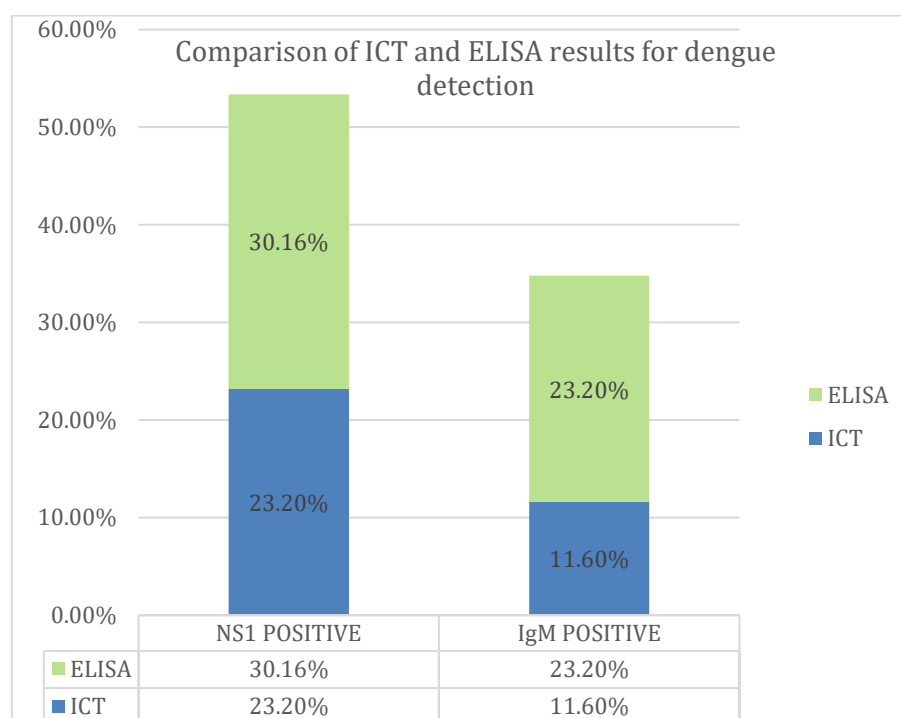
Dengue is one of the most rapidly spreading mosquito-borne viral infections worldwide⁶, caused by four antigenically distinct serotypes (DENV-1 to DENV-4) of the genus *Flavivirus*, family *Flaviviridae*. The infection is transmitted primarily by *Aedes aegypti* and *Aedes albopictus* mosquitoes. The global incidence of dengue has increased dramatically in recent decades, with nearly half of the world's population now at risk². In India, dengue poses a significant public health challenge due to rapid urbanization, population growth, poor waste management, and climatic factors conducive to mosquito breeding³. Historically, dengue was considered an urban disease; however, recent data indicate its expansion into rural areas¹. The disease exhibits periodic epidemics every 3–5 years, with a post-monsoon surge attributed to favorable conditions for *Aedes* proliferation. The clinical spectrum of dengue ranges from asymptomatic infection and dengue fever (DF) to severe manifestations such as dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS)⁶. Early diagnosis through NS1 antigen and IgM antibody detection plays a vital role in management and surveillance⁷. According to a meta-analysis, India accounts for nearly one-third of global dengue cases, with laboratory-confirmed prevalence among suspected patients estimated at 38.3%. Seroprevalence in the general Indian population was reported as 56.9%². Several regional studies in states like Maharashtra, Tamil Nadu, and Delhi have documented dengue positivity rates between 25% and 45% among clinically suspected cases, reflecting the widespread endemicity of the virus^{3,4}. This study seeks to provide updated seroepidemiological data for Uttar Pradesh, a state with diverse climatic zones, limited prior surveillance, and a high burden of vector-borne diseases.

MATERIALS AND METHODS

This descriptive cross-sectional study was carried out between August and December 2023 in the Department of Microbiology, Hind Institute of Medical Sciences, Barabanki (U.P.). Clinically suspected dengue patients presenting with acute febrile illness, headache, retro-orbital pain, rash, myalgia, arthralgia, or bleeding tendencies were enrolled after obtaining informed consent. Venous blood samples (5 ml) were collected aseptically; serum was separated and stored at 2–8°C until testing. Screening was performed using the J-Mitra dengue rapid ICT kit for NS1 antigen and IgM antibody detection. All ICT-positive samples and 20% of ICT-negative samples were re-tested using J-Mitra Dengue ELISA kits, following the manufacturer's protocol. Demographic variables such as age, gender, and month of presentation were recorded. Results were analyzed using descriptive statistics to determine positivity rates by test type, age, gender, and seasonal distribution.

RESULTS

Among the 431 samples tested, 130 (30.16%) were NS1 positive and 100 (23.2%) IgM positive by ELISA. Using ICT, 100 (23.2%) were NS1 positive and 50 (11.6%) IgM positive. This demonstrates the higher sensitivity of ELISA compared to ICT for both NS1 and IgM detection.

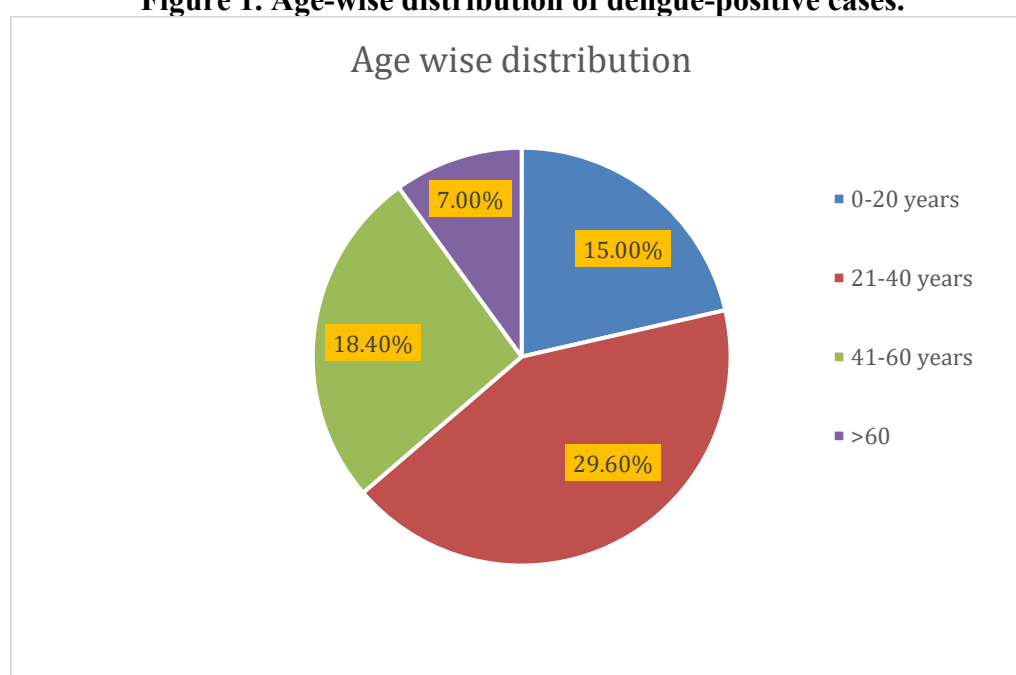


The age distribution revealed the highest positivity among patients aged 21–40 years (29.6%), followed by 0–20 years (15.0%), 41–60 years (18.4%), and above 60 years (7.0%).

Table 2. Age-wise distribution of dengue-positive cases.

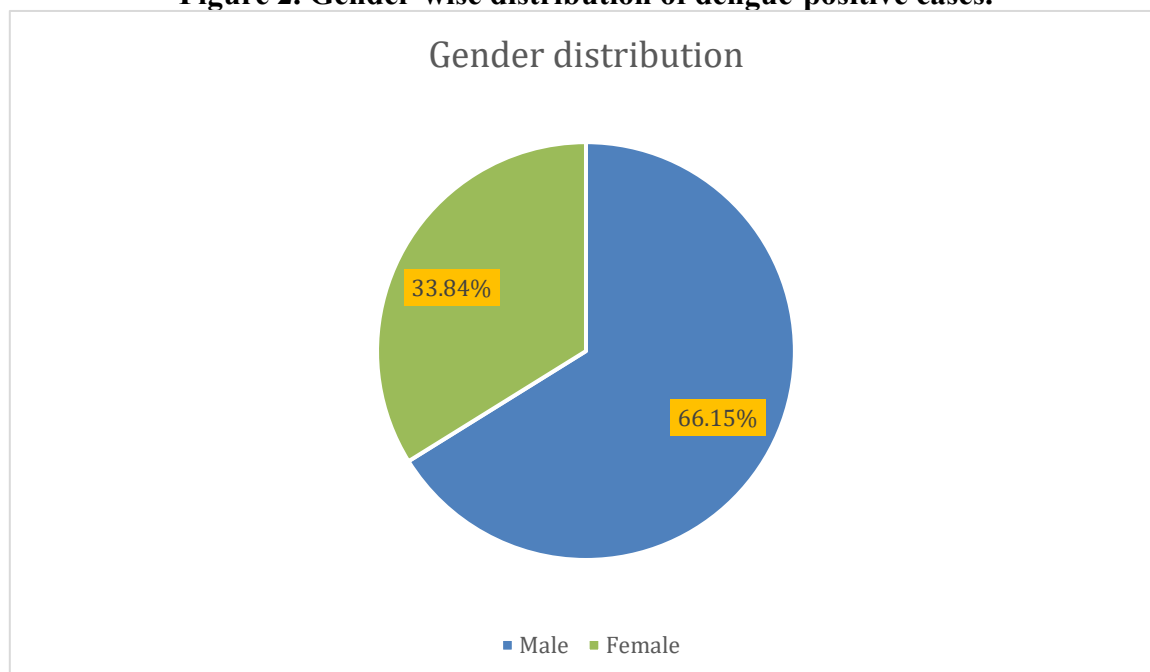
Age Group (years)	Positive Cases (%)
0–20	15.0
21–40	29.6
41–60	18.4
>60	7.0

Figure 1. Age-wise distribution of dengue-positive cases.



Males were disproportionately affected (66.15%) compared to females (33.84%), reflecting greater outdoor exposure among men.

Figure 2. Gender-wise distribution of dengue-positive cases.



The month-wise distribution of positive cases revealed the highest prevalence during September and October, correlating with the post-monsoon period when mosquito breeding peaks.

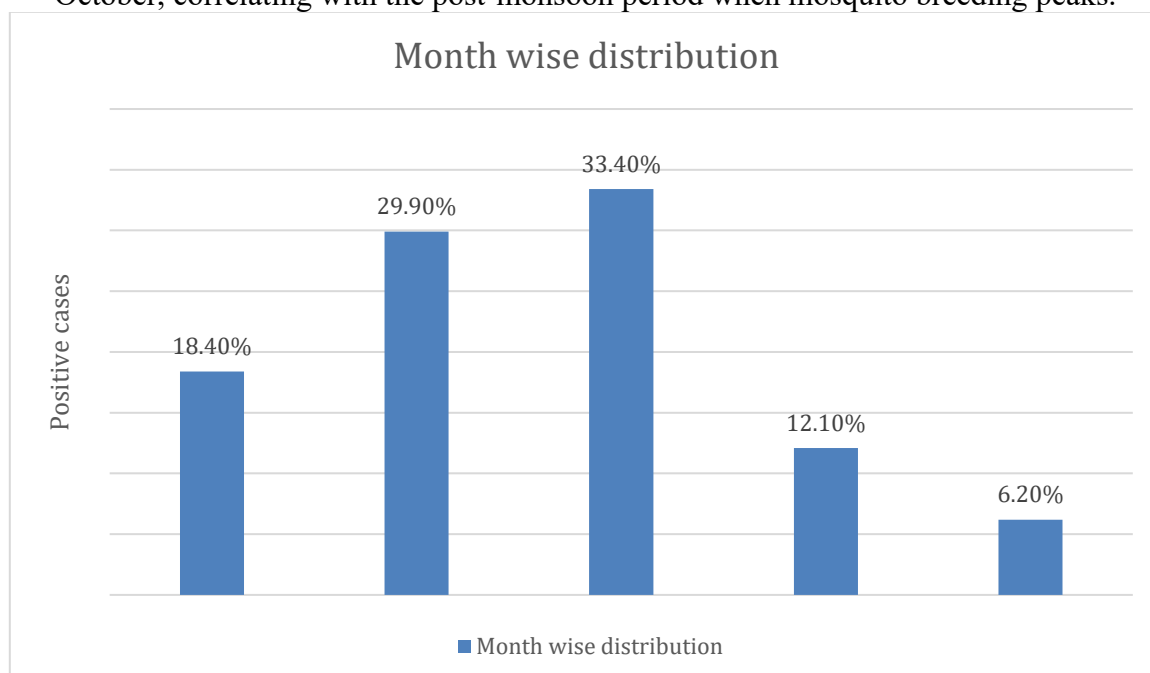


Table 4. Month-wise distribution of dengue-positive cases.

Month	Positive Cases (%)
August	18.4
September	29.9
October	33.4
November	12.1
December	6.2

DISCUSSION

The present study observed a 30.16% NS1 antigen and 23.2% IgM antibody positivity by ELISA among suspected dengue cases, findings consistent with those reported in several Indian studies. Nikam et al. (2015) in Central India reported 32.5% positivity⁴, while Shah et al. (2019) observed 20.5% among children in rural Maharashtra³. The current results fall within the national range of 25–40% positivity reported among hospital-based studies.

The dominance of young adults (21–40 years) aligns with observations across India, where working-age populations experience higher exposure due to occupational activities. Male predominance (66.15%) parallels national findings, attributed to increased outdoor exposure and health-seeking behavior differences¹. Seasonality showed a clear post-monsoon surge, confirming that rainfall and temperature variability play central roles in vector breeding and transmission intensity².

The comparison of ICT and ELISA indicates that ELISA provides greater sensitivity and specificity². ICT, while rapid and convenient, may yield false negatives due to low antigen levels or timing of sample collection. Combining NS1 and IgM assays enhances diagnostic yield across different infection phases. These findings emphasize the importance of deploying ELISA in tertiary care centers to confirm dengue diagnosis and support surveillance efforts.

Public health implications of this study include the necessity of early vector-control measures before the monsoon, active case reporting, and community awareness campaigns. Given the under-reporting of dengue in India—estimated to be several-fold higher than officially recorded figures—the true burden may be substantially underestimated. Hence, strengthening laboratory capacity, integrating molecular surveillance, and improving vector mapping are critical to controlling dengue transmission in endemic zones like Uttar Pradesh.

CONCLUSION

This comprehensive analysis underscores dengue as a significant and persistent public health concern in Uttar Pradesh. The study's findings—higher prevalence among males, concentration in young adults, and post-monsoon seasonality—mirror trends reported across India. ELISA-based diagnosis offers improved sensitivity over ICT and should be prioritized for hospital-based surveillance. Strengthening vector-control measures and promoting preventive awareness are essential components in reducing disease burden.

REFERENCES

1. Gupta N, Srivastava S, Jain A, Chaturvedi UC. Dengue in India. *Indian J Med Res.* 2012;136(3):373–390.
2. Mohan V, et al. Dengue infection in India: A systematic review and meta-analysis. *J Vector Borne Dis.* 2018;55(4):276–285.
3. Shah PS, Alagarasu K, Karad S, et al. Seroprevalence and incidence of primary dengue infections among children in rural Maharashtra. *BMC Infect Dis.* 2019;19:296.
4. Nikam A, Bhise PR, Deshmukh MM. Seroprevalence of Dengue infection in clinically suspected cases at a tertiary care hospital in Central India. *Int J Med Res Rev.* 2015;3(6):644–650.
5. National Serosurvey: Seroprevalence of dengue infection using IgG capture ELISA in India, 2017–18. ICMR/NIV, 2021.
6. Gubler DJ. Dengue and dengue hemorrhagic fever. *Clinical Microbiology Rev.* 1998;11(3):480–496.
7. Halstead SB. Pathogenesis of dengue: challenges to molecular biology. *Science.* 1988;239(4839):476–481.