



CLINICAL PROFILE AND DISEASE COURSE OF DENGUE IN HOSPITALIZED CHILDREN AT A TERTIARY CARE CENTER IN NORTH INDIA: A PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Background: Dengue is one of the most rapidly spreading mosquito-borne viral diseases worldwide and represents a major cause of pediatric morbidity and hospitalization in tropical countries. The clinical spectrum of dengue ranges from mild febrile illness to severe dengue characterized by plasma leakage, hemorrhage, shock, and organ dysfunction. Early identification of clinical and laboratory predictors of severity is essential for timely intervention and improved outcomes in children.

Objectives: To evaluate the clinical profile, laboratory parameters, disease severity, and outcomes of dengue infection in children admitted to a tertiary care hospital in North India.

Methods: A hospital-based prospective observational study was conducted in the Department of Paediatrics, Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, from June 2024 to June 2025. A total of 309 laboratory-confirmed dengue cases in children aged <18 years were enrolled. Data regarding demographic characteristics, clinical manifestations, warning signs, laboratory investigations, imaging findings, WHO 2009 dengue severity classification, and clinical outcomes were collected and analyzed. Statistical analysis was performed using chi-square test and one-way ANOVA, with a p-value <0.05 considered statistically significant.

Results: Of the 309 children, 51.1% had dengue without warning signs, 31.1% had dengue with warning signs, and 17.8% had severe dengue. Age and gender were not significantly associated with disease severity. Abdominal pain, gastrointestinal bleeding, mucosal bleeding, respiratory distress, altered sensorium, and convulsions were significantly associated with severe dengue ($p < 0.05$). Signs of plasma leakage such as pleural effusion, ascites, hepatomegaly, and splenomegaly also correlated with severity. Severe thrombocytopenia and elevated liver enzymes (AST and ALT) were significantly more common in severe dengue. Recovery occurred in 98.4% of cases, and mortality was 1.6%, with all deaths occurring in the severe dengue group.

Conclusion: Abdominal pain, bleeding manifestations, neurological symptoms, respiratory distress, plasma leakage signs, thrombocytopenia, and elevated liver enzymes are important predictors of severe dengue in children. Early recognition of these indicators can facilitate timely intervention and reduce dengue-related morbidity and mortality in pediatric populations.

Keywords: Dengue fever, pediatric dengue, severe dengue, clinical profile, WHO classification, thrombocytopenia, plasma leakage, liver enzymes

Introduction

Dengue is a mosquito-borne viral disease caused by the dengue virus (DENV), a single-stranded RNA virus belonging to the *Flaviviridae* family. There are four antigenically distinct serotypes (DENV-1 to DENV-4), and infection with any serotype can result in a wide spectrum of clinical manifestations. Dengue is transmitted primarily by *Aedes aegypti* and *Aedes albopictus* mosquitoes, which are day-biting vectors that thrive in urban and semi-urban environments.

Over the past few decades, dengue has emerged as a major global public health problem, with a dramatic increase in incidence, geographic spread, and disease burden. According to recent estimates, dengue affects millions of individuals annually, with a substantial proportion occurring in Asia. India contributes significantly to the global dengue burden, with recurrent outbreaks reported across multiple states, including Uttar Pradesh.

Children are particularly vulnerable to dengue infection and are more likely to develop severe disease compared to adults. The pediatric population often presents with atypical symptoms, and disease progression can be rapid, necessitating early recognition and prompt management. Severe dengue is characterized by plasma leakage leading to shock, severe bleeding, and organ dysfunction, including hepatic, neurological, and respiratory complications.

The World Health Organization (WHO) revised dengue classification in 2009 to categorize cases into dengue without warning signs, dengue with warning signs, and severe dengue. This classification emphasizes early identification of warning signs to prevent progression to severe disease. Despite these guidelines, there is limited region-specific data on the clinical profile and predictors of severe dengue in children in North India.

Therefore, this study aimed to evaluate the clinical profile, laboratory abnormalities, disease severity, and outcomes of dengue infection in hospitalized children at a tertiary care center in Bareilly, Uttar Pradesh.

Materials and Methods

Study Design and Setting

This was a prospective hospital-based observational study conducted in the Department of Paediatrics at Rajshree Medical Research Institute, Bareilly, Uttar Pradesh, India. The study period extended from June 2024 to June 2025.

Study Population

Children aged less than 18 years admitted with laboratory-confirmed dengue infection were included in the study. Dengue infection was confirmed by detection of NS1 antigen and/or dengue IgM antibodies using a rapid immunochromatographic test.

Inclusion Criteria

- Children aged <18 years
- Laboratory-confirmed dengue infection
- Informed consent obtained from parents/guardians

Exclusion Criteria

- Children with alternative confirmed diagnosis explaining febrile illness
- Incomplete clinical or laboratory data
- Refusal of consent

Sample Size Calculation

The sample size was calculated using the formula: $n = \frac{Z^2 P(1 - P)}{e^2}$, where $Z = 1.96$ (95% confidence level), $P = 0.28$ (estimated prevalence), and $e = 0.05$ (margin of error).

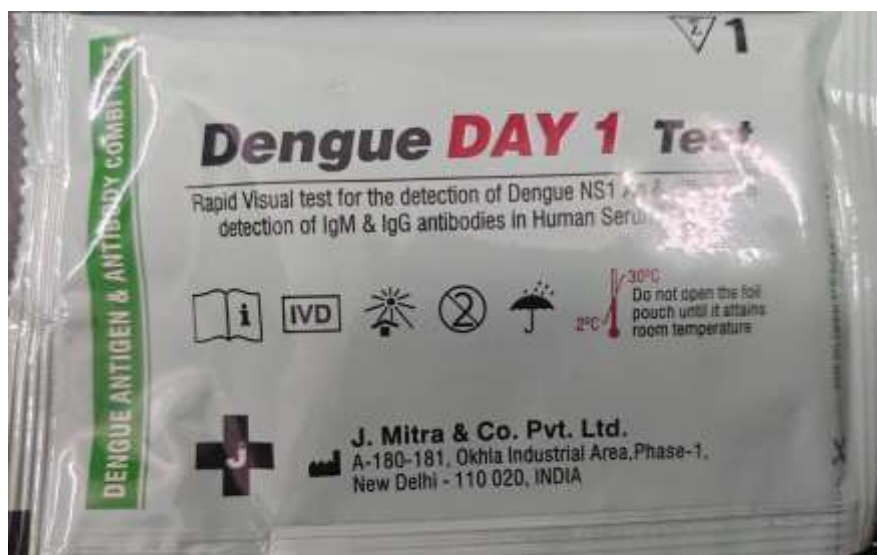
The calculated sample size was 309 children, and all eligible cases were enrolled.

Data Collection

A structured proforma was used to collect demographic data, clinical features, warning signs, physical examination findings, laboratory investigations, imaging results, and outcomes.

Clinical Evaluation

A detailed history regarding duration of fever, headache, myalgia, vomiting, abdominal pain, rash, and bleeding manifestations was recorded. A thorough physical examination was performed, including vital signs and systemic examination to identify hepatomegaly, splenomegaly, ascites, pleural effusion, and neurological abnormalities.



Dengue Day 1 Test kit pouch used for detection of NS1 antigen and dengue antibodies



Dengue NS1 antigen and IgM/IgG antibody rapid test device used for laboratory confirmation of dengue infection

Laboratory Investigations

Baseline laboratory investigations included hemoglobin, hematocrit, platelet count, total leukocyte count, and liver enzymes (AST and ALT). Investigations were repeated as clinically indicated.

Imaging Studies

Chest radiography and ultrasonography of the abdomen were performed when clinically indicated to detect plasma leakage.

Disease Classification

Cases were classified according to WHO 2009 dengue classification into:

1. Dengue without warning signs
2. Dengue with warning signs
3. Severe dengue

Outcome Assessment

Clinical outcomes included recovery, complications, and mortality.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 23. Continuous variables were expressed as mean $\pm$ SD or median (IQR). Categorical variables were expressed as frequencies and percentages. Chi-square test and ANOVA were used to determine associations. A p-value <0.05 was considered statistically significant.

Results

Demographic Characteristics

A total of 309 children with laboratory-confirmed dengue were included. The majority of cases were in the 6–12 year age group (43.4%), followed by adolescents aged 13–18 years (23.3%). Infants constituted 10.4% of cases.

Males accounted for 56.9% of cases, while females accounted for 43.1%. There was no statistically significant association between age or gender and disease severity.

Severity Distribution

According to WHO classification:

- Dengue without warning signs: 51.1%
- Dengue with warning signs: 31.1%
- Severe dengue: 17.8%

Clinical Manifestations

General Symptoms

Fever was present in all children. Headache, myalgia, arthralgia, and rash were reported but did not significantly correlate with disease severity.

Gastrointestinal Symptoms

Vomiting (56.9%) and abdominal pain (58.9%) were common. Abdominal pain showed a strong association with dengue severity ($p<0.001$).

Bleeding Manifestations

Gastrointestinal bleeding, mucosal bleeding, and skin bleeds were significantly associated with severe dengue.

Respiratory and Neurological Symptoms

Breathlessness, altered sensorium, and convulsions were significantly more common in severe dengue.

Clinical Signs

Signs of plasma leakage such as pleural effusion, ascites, hepatomegaly, and splenomegaly were significantly associated with severe dengue.

Laboratory Findings

Hematological Parameters

Thrombocytopenia was significantly associated with disease severity. Leukopenia and hematocrit changes were not significantly associated.

Liver Enzymes

Elevated AST and ALT levels were significantly more common in severe dengue.

Clinical Outcome

Recovery was observed in 98.4% of children. Mortality was 1.6%, with all deaths occurring in the severe dengue group.

Discussion

This prospective observational study provides a comprehensive evaluation of the clinical profile, laboratory abnormalities, severity distribution, and outcomes of dengue infection in hospitalized children in North India.

The majority of cases were observed in school-aged children, consistent with previous studies. Age and gender were not significant predictors of disease severity, suggesting that host immune response and viral factors may play a more important role.

Gastrointestinal symptoms, particularly abdominal pain, were strongly associated with severe dengue, consistent with WHO warning signs. Bleeding manifestations were significantly associated with severe disease, reflecting endothelial dysfunction and thrombocytopenia.

Respiratory distress and neurological manifestations were strong indicators of severe dengue, highlighting the need for close monitoring of these complications. Signs of plasma leakage correlated with severity, confirming the central role of capillary leakage in dengue pathophysiology. Laboratory findings showed that thrombocytopenia and elevated liver enzymes were reliable predictors of severe dengue, consistent with previous pediatric studies.

The low mortality rate observed in this study reflects effective clinical management and early detection of severe cases.

Conclusion

This study demonstrates that abdominal pain, bleeding manifestations, respiratory distress, neurological involvement, plasma leakage signs, severe thrombocytopenia, and elevated liver enzymes are key predictors of severe dengue in children. Early recognition and monitoring of these indicators are crucial for preventing progression to severe disease and improving outcomes.

Limitations

This was a single-center hospital-based study, limiting generalizability. Viral serotyping and long-term follow-up were not performed. Imaging was not uniformly conducted in all cases, which may have led to under-detection of subclinical plasma leakage.

Recommendations

Early identification of warning signs, serial laboratory monitoring, and strict adherence to dengue management protocols are recommended. Community awareness and vector control measures should be strengthened. Multicentric studies with virological characterization are required.

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