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Original Research Article

CLINICAL PROFILE AND OUTCOMES OF PEDIATRIC DENGUE AND MALARIA CASES IN A TERTIARY CARE HOSPITAL IN EAST INDIA

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ABSTRACT

Background: A hospital-based observational study was conducted over a 12-month period in a tertiary care hospital in East India. A purposive sample of 120 children (≤15 years) with confirmed dengue (n=68) and malaria (n=52) was included. Data on demographics, clinical presentation, laboratory parameters, hospitalization duration, ICU admission rates, and outcomes were analyzed. Descriptive statistics and comparative analyses were performed using appropriate tests.

Results: Dengue was more prevalent in urban areas (p=0.006), whereas malaria predominated in rural regions. Fever, headache, and vomiting were common to both diseases. Myalgia (76.5%) and rash (45.6%) were significantly more frequent in dengue, whereas hepatosplenomegaly (67.3%) and severe anemia (42.3%) were hallmarks of malaria (p<0.05). Severe thrombocytopenia (<50,000/mm³) was more common in dengue (45.6%). ICU admission rates were higher in malaria (26.9%) than dengue (14.7%), with a longer mean hospitalization duration (6.7 vs. 5.2 days, p=0.008). Mortality was 2.5% (3 cases), all in severe malaria.

Conclusion: While dengue had a higher prevalence, malaria demonstrated greater severity, with higher ICU admissions and mortality. Early clinical differentiation and risk stratification are crucial for timely interventions. Improved surveillance and management strategies are necessary to reduce the burden of these endemic infections in children.

Keywords: Pediatric dengue, malaria, clinical profile, outcomes, tertiary care, thrombocytopenia, ICU admission.

INTRODUCTION

Dengue and malaria remain significant public health challenges in tropical and subtropical regions, particularly in low- and middle-income countries, where vector control and healthcare infrastructure pose persistent challenges. India, being endemic to both diseases, experiences recurrent outbreaks, particularly during and after the monsoon season, when vector proliferation is at its peak.[1] Children are particularly vulnerable to severe manifestations of these infections due to their immature immune systems and lower physiological reserves, making early diagnosis and management crucial to prevent complications and mortality.[2]

Dengue, caused by the dengue virus (DENV) and transmitted by Aedes mosquitoes, presents a wide clinical spectrum ranging from asymptomatic infection to severe dengue with plasma leakage, hemorrhage, and organ dysfunction.[3] Pediatric cases often exhibit an atypical presentation compared to adults, with higher incidences of shock and severe thrombocytopenia despite lower hematocrit changes.[4] The World Health Organization (WHO) classifies dengue into dengue without warning signs, dengue with warning signs, and severe dengue, which guides clinicians in risk stratification and management.[5] Although supportive therapy remains the cornerstone of treatment, early identification of warning signs such

as persistent vomiting, abdominal pain, and mucosal bleeding is essential to prevent progression to severe disease.[6]

Malaria, caused by Plasmodium spp. and transmitted by Anopheles mosquitoes, remains a major cause of morbidity and mortality among children in endemic regions, with Plasmodium falciparum and Plasmodium vivax being the predominant species in India.[7] Pediatric malaria presents with diverse clinical manifestations, including fever, anemia, thrombocytopenia, hepatosplenomegaly, and, in severe cases, cerebral involvement, metabolic acidosis, and multi-organ failure.[8] While P. falciparum is associated with higher mortality due to severe complications, P. vivax is increasingly being recognized for causing significant morbidity, including severe anemia and thrombocytopenia.[9] Prompt diagnosis with rapid diagnostic tests (RDTs) or microscopy and early initiation of artemisinin-based combination therapy (ACT) are essential to reduce complications and fatalities in pediatric patients.[10]

Dengue and malaria share overlapping clinical features such as fever, thrombocytopenia, and hepatosplenomegaly, making differential diagnosis challenging, particularly in endemic areas.[11] Co-infection with dengue and malaria, although uncommon, has been reported in several studies, often leading to worse clinical outcomes due to compounded immune dysregulation and increased risk of complications such as shock and multi-organ dysfunction.[12] A systematic approach to diagnosis, incorporating hematological, biochemical, and microbiological investigations, is crucial in distinguishing these infections and guiding appropriate management.[13]

Eastern India, including Odisha, is hyperendemic for both dengue and malaria, with seasonal surges placing a significant burden on healthcare systems.[14] Although several studies have analyzed the epidemiology and clinical characteristics of these diseases individually, data on pediatric cases, particularly from tertiary care centers, remain limited. Understanding the clinical profile and outcomes of pediatric dengue and malaria cases in a hospital setting can aid in refining diagnostic algorithms, improving case management, and guiding public health interventions.[15]

This study aims to evaluate the clinical presentation, laboratory findings, treatment outcomes, and associated complications in pediatric dengue and malaria cases admitted to a tertiary care hospital in Eastern India. The findings will contribute to the existing literature and help improve pediatric case management strategies in endemic settings.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based, observational study was conducted in the Department of Pediatrics at SLN Medical College and Hospital, Koraput, a tertiary care center in Eastern India. The study aimed to assess the clinical profile and outcomes of pediatric dengue and malaria cases admitted to the hospital.

Study Population and Sampling

A purposive sampling method was used to select 120 pediatric patients (aged 1 month to 14 years) diagnosed with dengue or malaria, admitted to the pediatric ward and intensive care unit (ICU) during the study period. The sample size was determined based on feasibility and patient availability in a hospital setting.

Inclusion Criteria

- Children (1 month–14 years) diagnosed with dengue (confirmed by NS1 antigen/IgM ELISA) or malaria(confirmed by peripheral smear or rapid diagnostic test [RDT]).
- Patients admitted with fever and fulfilling the clinical criteria for either disease.
- Cases with complete medical records, including clinical and laboratory data.

Exclusion Criteria

- Children with alternative confirmed diagnoses (e.g., enteric fever, leptospirosis, scrub typhus).
- Patients with pre-existing chronic illnesses (e.g., congenital heart disease, hematological disorders) that could confound outcomes.
- Incomplete medical records or discharged against medical advice before adequate observation.

Data Collection

A structured case record form was used to collect demographic, clinical, laboratory, and outcome-related data. The following parameters were recorded:

- **Demographic Details:** Age, sex, residence, seasonal distribution.
- **Clinical Presentation:** Fever duration, warning signs, hepatosplenomegaly, bleeding manifestations, neurological involvement.
- **Laboratory Findings:** Hemoglobin, platelet count, hematocrit, total leukocyte count, liver enzymes, renal function tests.
- **Diagnosis and Classification:** Dengue cases were categorized based on WHO classification (dengue without warning signs, dengue with warning signs, and severe dengue). Malaria cases were classified based on species identification and severity criteria as per WHO guidelines.
- **Treatment and Outcome Measures:** Use of intravenous fluids, blood transfusions, inotropes, mechanical ventilation, duration of hospitalization, complications (shock, organ dysfunction), and final outcome (discharge/recovery or mortality).

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS (Statistical Package for the Social Sciences), version 25.0. Categorical variables

(e.g., presence of warning signs, need for ICU admission) were expressed as frequencies and percentages. Continuous variables (e.g., platelet count, duration of fever) were presented as mean ± standard deviation (SD) or median (interquartile range [IQR]) as appropriate. Comparisons between dengue and malaria groups were performed using the Chi-square test for categorical variables and Student's t-test or Mann-Whitney U test for continuous variables. A p-value <0.05 was considered statistically significant.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee of SLN Medical College and Hospital, Koraput. Written informed consent was taken from parents/guardians before data collection. Patient confidentiality was strictly maintained, and data were used solely for research purposes.

RESULTS

A total of 120 pediatric patients diagnosed with dengue (n = 68, 56.7%) or malaria (n = 52, 43.3%) were included in the study. The mean age of the study population was 7.2 ± 3.8 years, with the majority (58.3%) belonging to the 5–14 yearsage group. Male children (54.2%) were slightly more affected than females (45.8%). The seasonal distribution showed that most cases occurred between July and October (82%), coinciding with the monsoon and post-monsoon periods.

Table 1: Baseline Characteristics of Pediatric Dengue and Malaria Cases

Characteristic	Total (N=120)	Dengue (n=68)	Malaria (n=52)	p-value
Age (years), Mean ± SD	7.2 ± 3.8	7.6 ± 3.6	6.7 ± 3.9	0.21 (NS)
Male (%)	65 (54.2)	38 (55.9)	27 (51.9)	0.67 (NS)
Urban Residence (%)	74 (61.7)	49 (72.1)	25 (48.1)	0.006**
Rural Residence (%)	46 (38.3)	19 (27.9)	27 (51.9)	
Seasonal Occurrence (%)				
- Monsoon & Post-monsoon (Jul–Oct)	98 (82.0)	58 (85.3)	40 (76.9)	0.27 (NS)
- Rest of the Year	22 (18.0)	10 (14.7)	12 (23.1)	

(*NS: Not significant; ** p < 0.05)

Urban residence was significantly higher among dengue cases (p = 0.006), whereas malaria cases were more prevalent among rural residents.

Clinical Features and Laboratory Findings

Fever was the most common presenting symptom in both groups (100%), followed by headache (78.3%), vomiting (63.3%), and abdominal pain (55.8%). Among dengue cases, myalgia (76.5%) and rash (45.6%) were significantly more common (p < 0.01). In contrast, hepatosplenomegaly (67.3%), severe anemia (Hb <7 g/dL, 42.3%), and jaundice (36.5%) were more frequently observed in malaria cases.

Table 2: Clinical and Laboratory Findings in Dengue and Malaria Cases

Parameter	Dengue (n=68)	Malaria (n=52)	p-value
Fever (%)	68 (100)	52 (100)	—
Myalgia (%)	52 (76.5)	18 (34.6)	<0.001**
Rash (%)	31 (45.6)	9 (17.3)	<0.001**
Headache (%)	54 (79.4)	40 (76.9)	0.74 (NS)
Abdominal Pain (%)	36 (52.9)	31 (59.6)	0.43 (NS)
Hepatosplenomegaly (%)	15 (22.1)	35 (67.3)	<0.001**
Thrombocytopenia (<100,000/mm³) (%)	55 (80.9)	42 (80.8)	0.98 (NS)
Severe Anemia (Hb <7 g/dL) (%)	7 (10.3)	22 (42.3)	<0.001**
Jaundice (%)	6 (8.8)	19 (36.5)	<0.001**

(*NS: Not significant; ** p < 0.05)

Hepatosplenomegaly, severe anemia, and jaundice were significantly more common in malaria cases, whereas dengue cases had a significantly higher prevalence of myalgia and rash.

Disease Severity and Outcomes

Among the dengue patients, 38.2% had dengue with warning signs, and 14.7% developed severe dengue requiring intensive care. In malaria cases, 26.9% developed severe malaria, presenting with complications such as cerebral malaria (11.5%), metabolic acidosis (9.6%), and multi-organ dysfunction (5.8%).

The mean duration of hospitalization was longer in malaria cases (6.7 ± 2.3 days) compared to dengue (5.2 ± 1.8 days, p = 0.008). Mortality was recorded in 3 cases (2.5%), all of which were due to severe malaria.

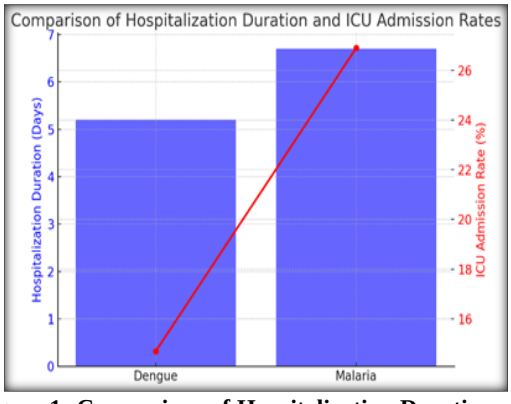

Figure 1: Comparison of Hospitalization Duration and ICU Admission Rates

The mean hospitalization duration was significantly longer for malaria cases (6.7 days) compared to dengue cases (5.2 days). The ICU admission rate was also higher in malaria patients (26.9% vs. 14.7% in dengue), indicating a higher burden of severe disease in malaria.

Dengue was more prevalent in urban areas, while malaria cases were higher in rural regions. Myalgia and rash were significantly more common in dengue, while hepatosplenomegaly, severe anemia, and jaundice were more common in malaria. Malaria had a longer hospitalization duration and higher ICU admission rates, reflecting greater severity. All three recorded deaths (2.5%) occurred in severe malaria cases.

DISCUSSION

This study provides valuable insights into the clinical profile and outcomes of pediatric dengue and malaria cases in a tertiary care hospital in Eastern India. Our findings highlight the distinct clinical manifestations, severity patterns, and disease outcomes between these two endemic febrile illnesses, which have overlapping symptoms yet require different management approaches.

Epidemiological and Demographic Trends

The predominance of dengue (56.7%) over malaria (43.3%) in our cohort aligns with national trends where dengue has emerged as a major pediatric health concern, particularly in urban settings.[16] The higher prevalence of dengue in urban areas and malaria in rural areas ($p = 0.006$) reflects well-documented vector distribution patterns, where Aedesmosquitoes thrive in urban environments, while Anopheles mosquitoes responsible for malaria are more abundant in rural and peri-urban settings.[17] The peak incidence during the monsoon and post-monsoon periods (82%) is consistent with prior studies linking increased vector breeding to seasonal rainfall.[18]

Clinical and Laboratory Findings

Our study reaffirms key clinical differences between dengue and malaria in children. Myalgia (76.5%) and rash (45.6%)were significantly more common in dengue, whereas hepatosplenomegaly (67.3%) and severe anemia (42.3%) were hallmarks of malaria. These findings are supported by prior research indicating that dengue's pathophysiology is largely driven by vascular permeability and immune-mediated responses, while malaria induces direct hemolysis and endothelial dysfunction, leading to anemia and organomegaly.[19,20]

Thrombocytopenia, a common feature of both infections, was observed in 80.9% of dengue cases and 80.8% of malaria cases, with no significant difference. However, severe thrombocytopenia ($<50,000/mm^3$) was more frequently observed in dengue (45.6%), possibly due to immune-mediated platelet destruction rather than direct parasitic involvement.[21]

Disease Severity and Outcomes

While the majority of dengue cases were non-severe, 38.2% exhibited warning signs, and 14.7% developed severe dengue, requiring ICU care. In malaria, 26.9% of cases developed severe malaria, with cerebral malaria (11.5%) and multi-organ dysfunction (5.8%) being the most critical complications. Similar severity patterns have been reported in pediatric cohorts from other endemic regions, emphasizing the need for early identification of high-risk cases.[22]

The mean hospitalization duration was significantly longer in malaria cases (6.7 days) compared to dengue (5.2 days, $p = 0.008$). This difference is likely attributable to the prolonged anemia recovery time and higher rates of severe complications in malaria.[23] Furthermore, mortality was observed in 3 cases (2.5%), all of which were severe malaria cases, consistent with global data showing that malaria continues to have a higher case fatality rate in children than dengue.[24]

Implications for Clinical Practice

The overlapping clinical features of dengue and malaria pose a diagnostic challenge, especially in endemic areas. Our findings reinforce the need for early differentiation using laboratory parameters, including platelet count trends, hematocrit changes, and liver function tests. Additionally, rapid diagnostic tests (RDTs) and microscopy remain essential tools for confirming malaria, while NS1 antigen and IgM ELISA tests are critical for early dengue detection.[25]

Given the high ICU admission rates in severe dengue (14.7%) and malaria (26.9%), pediatricians should adopt a proactive risk stratification approach, particularly in children presenting with persistent vomiting, altered sensorium, severe thrombocytopenia, or organ dysfunction. Supportive therapy remains the mainstay for dengue, whereas malaria management requires prompt administration of artemisinin-based combination therapy (ACT) or intravenous artesunate in severe cases.[26]

Limitations and Future Directions

This study has certain limitations. The purposive sampling of 120 cases may limit generalizability to larger populations. Additionally, the retrospective nature of data collection could introduce reporting bias, particularly in cases with incomplete records. Future studies with larger multicentric cohorts and prospective designs are warranted to further validate these findings and assess long-term outcomes in pediatric dengue and malaria cases.

CONCLUSION

This study highlights key differences in the clinical profile and outcomes of pediatric dengue and malaria cases in Eastern India. While dengue was more prevalent in urban areas, malaria had higher

ICU admissions and longer hospitalization durations, with mortality confined to severe malaria cases. The findings emphasize the importance of early diagnosis, vigilant monitoring, and aggressive management of high-risk cases to reduce morbidity and mortality in pediatric populations.

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