

A retrospective study of factors affecting hospitalization of dengue patients among children and adolescents in Bihar region

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Received: 10-12-2024 / Revised: 18-01-2025 / Accepted: 23-02-2025

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Conflict of interest: Nil

Abstract:

Background: Dengue fever epidemics have been reported in tropical, subtropical, and temperate regions across the globe during the previous three centuries. There are 50 million cases of Dengue fever and 100 million cases of Dengue fever reported annually globally; the case fatality rate in Asia varies from 0.5% to 3.5%.

Aim: The study was to investigate the factors that influence the duration of hospitalization in pediatric and adolescent patients with dengue.

Methodology: A retrospective research was undertaken in the 'Department of Community Medicine, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India'. The research involved 60 patients. In children with a strong clinical suspicion of Dengue infection, NS1 antigen and/or Dengue antibodies IgM and IgG were assessed. Individuals with confirmed Dengue cases provided written informed permission and were questioned about the risk factors associated with Dengue infection.

Results: The predominant demographic of hospitalized patients included adolescents, older children, and men. The majority had a hospitalization period of 4 to 6 days. No statistically significant correlation was seen between the relevant parameters and the length of hospitalization.

Conclusion: The dengue mostly affects adolescents and older children, with a higher incidence in men, suggesting more external contact to the vector. The correlation between socio-demographic and clinical parameters such as platelet count and hemoglobin level.

Keywords: Case fatality, Dengue, Duration of Hospitalization, Pediatric, Platelet Count.

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Introduction

The primary virus that mosquitoes transmit, dengue fever, is the most common arthropod-borne viral disease in the world and a serious hazard to public health. Serious muscular spasms, joint pain, and a high temperature are indicative of the sickness's severity and length. This condition is often referred to as "breakbone" or 7-day fever. Even though the majority of instances of dengue fever are asymptomatic, infections may cause serious disease or even death. Specifically, *Aedes aegypti* and *A. albopictus* are the main carriers. Due mostly to an increase in international travel, dengue fever has significantly increased in the last several decades and is now endemic in a number of different parts of the world. Following a case of dengue hemorrhagic fever certain individuals who had previously experienced significant bleeding and capillary permeability from a dengue virus infection [1-3].

Despite the fact that the signs and symptoms are similar to those of other viral prodromes.

Dengue fever is caused by a single-stranded RNA virus from the Flavivirus genus, which comes in four different serotypes. One serotype is granted permanent immunity through infection, while others are not [4-6]. It is composed of a lipid envelope, 3-structural proteins, seven non-structural proteins, and a positive-sense single-stranded RNA that is 10.7 kb-capped. As many as 75% of infections may be asymptomatic. Dengue fever may either cure spontaneously or cause serious hemorrhage and shock. Severe dengue is only produced by 0.5 to 5% of infections. In cases when therapy is insufficient, mortality rates might exceed twenty percent, especially in the case of children. The main potential targets are dermal macrophages and dendritic cells. It is thought that contaminated cells go to lymph

nodes before using the lymphatic system to migrate to other organs. A virus known as viremia may be found in the bloodstream 24 to 48 hours before symptoms manifest.

There is a paucity of focused research in India about the length of hospitalization and the factors that affect it in pediatric and adolescent populations. This research is pertinent due to the recurrent outbreaks in India, the burden of disease during epidemics, the impact on hospital admissions, and the need for platelet transfusions [7]. Characteristics associated with hospitalization duration must be included into patient assessment and treatment procedures to enhance care quality. The ambiguity in the existing literature on the correlation between platelet count and duration of hospitalization necessitates more research. The study aimed to identify the factors influencing the duration of hospitalization in pediatric and adolescent dengue patients, evaluate the relationship between clinical-demographic factors and hospitalization duration, and ascertain the proportion of pediatric and adolescent patients necessitating platelet transfusion [8].

Methodology

A retrospective study was conducted at the Department of Community Medicine, Netaji Subhas Medical College and Hospital in Bihta, Patna, Bihar, India for six months. The study included 60 patients. Children with a significant clinical suspicion of Dengue infection underwent testing for NS1 antigen and/or Dengue antibodies IgM and IgG. Patients with positive Dengue diagnoses provided written informed consent and discussed the hazards associated with Dengue infection. The pre-structured questionnaire included details on the patient's demographics, risk factors, clinical presentation, Dengue infection pattern, and outcomes. A connection between risk factors and mortality was also identified.

Inclusion Criteria

- Patients of all ages with a temperature of $>38.5^{\circ}\text{C}$ for more than 24 hrs and clinically confirmed with dengue fever.

Exclusion Criteria

- Dengue sufferers weren't need hospitalization.

- Dengue patients with a specific source of infection.
- Bleeding was an issue from infancy.
- Immunocompromised patients.

Dengue fever, dengue shock syndrome, and dengue hemorrhagic fever were identified according to World Health Organization (WHO) criteria. The study only included people exhibiting typical dengue symptoms, including fever with chills, malaise, headache, rash, hemorrhagic manifestations, and thrombocytopenia, with a positive ELISA test result. Participants diagnosed with malaria or enteric fever were excluded from the research. A comprehensive history and clinical assessment were performed. Hematological profiles and biochemical assessments were conducted at admission, with daily evaluations as required until discharge. Chest radiography and abdominal ultrasonography were used to assess indicators of plasma leakage. Targeted studies were conducted in individuals with neurological involvement or hepatic failure.

Statistical analysis

The statistical analysis was conducted using SPSS software, specifically version 27. The student's t-test was used to compare the mean values between the two groups for data adhering to a parametric distribution. Either the Chi-square test was used to analyze categorical data. P-value below 0.05 was indicated the statistical significance of result.

Results

A total of 60 patients in which, the predominant age group of patients (36.67%) was under 1 year old, with a virtually uniform distribution throughout the other age categories. Males constituted 58.33% of the sample, and females represented 41.67%. Concerning the period of hospitalization, 38.33% were admitted for 4 to 6 days, whilst 35% were hospitalized for 3 days or less. Seventy-five percent of patients had hemoglobin levels below 12 mg/dl at the time of admission. Regarding platelet counts, 31.67% exhibited counts ranging from 51,000 to 100,000, whilst 20% presented levels below 20,000. Twenty-six point sixty-seven percent of patients needed platelet transfusion. Significantly, all patients were devoid of co-morbidities, with a complete 100% classification indicating the absence of such conditions.

Table 1: clinical and demographic characteristics

Demographic Characteristics (N=60)		No.	%
Age Group	11 to 20 years	11	18.33%
	6 to 10 years	8	13.33%
	1 to 5 years	19	31.67%
	Less than 1 year	22	36.67%
Gender	Male	35	58.33%
	Female	25	41.67%
Duration of Hospitalization	3 or less than three	21	35%
	4-6 days	23	38.33%
	7 or more than 7 days	16	26.67%
Hemoglobin level on the Day of admission	Less than 12 mg/dl	45	75%
	More than 12 gm/dl	15	25%
Platelet Count on the day of admission	Less than equal to 20,000	12	20%
	21000 to 50000	7	11.67%
	51000 to 1 lac	19	31.67%
	1 lac to 1.5 lac	8	13.33%
	More than 1.5 lac	14	23.33%
Required Platelet transfusion	Yes	16	26.67%
	No	44	73.33%
Co-morbidity	Yes	0	0%
	No	60	100%

The manifestations and consequences associated with dengue disease. The predominant symptom described was stomach discomfort (33.33%), followed by dyspnea (30%), fever (20%), and skin rash (16.67%). The most common consequence was hepatic dysfunction (30%), followed by multi-organ

failure (25%), renal failure (20%), encephalopathy (13.33%), and ARDS (11.67%). These results underscore the substantial burden of symptoms and serious consequences linked to dengue fever in this patient sample.

Table 2: Complications and symptoms of dengue fever

	N	%
Symptoms		
Breathlessness	18	30%
Fever	12	20%
Abdomen pain	20	33.33%
Skin rash	10	16.67%
Complications		
ARDS	7	11.67%
Multi organ failure	15	25%
Encephalopathy	8	13.33%
Hepatic dysfunction	18	30%
Renal failure	12	20%

The allocation of serologically verified dengue cases among patients. A total of 36.67% tested serology-positive, with 16.67% positive for NS1 Ag and another 16.67% positive for both IgM and IgG antibodies. Simultaneously, 30% of the patients

tested serology-negative. The data reveals that a substantial number of patients were diagnosed with dengue using serological testing, although a lesser fraction did not show positive serological findings.

Table 3: The distribution of patients who tested positive for dengue

Dengue positive patients	N	%
NS1 Ag	10	16.67%
Both IgM and IgG	10	16.67%
Total serology positive	22	36.67%
Total serology negative	18	30%

Discussion

Dengue is a significant developing disease in tropical and subtropical regions. The identification is predicated on clinical features, notwithstanding the many manifestations it may exhibit [9, 10]. This research encompasses the clinical profile, laboratory characteristics, and outcomes of DF/DHF/DSS in pediatric patients. The distribution of patients was virtually even among other age categories, with the preponderance (36.67%) being under the age of one. The sample was composed of 58.33% males and 41.67% females. In terms of hospitalization duration, 38.33% of patients remained for 4-6 days, while 35% remained for 3 or fewer days. Upon admittance, the hemoglobin levels of the majority of patients (75%) were less than 12 mg/dl. In terms of platelet counts, 31.67% of patients had counts between 51,000 and 1 lakh, while 20% had levels below 20,000. Out of the total number of patients, 26.67% required platelet transfusions. It is important to note that none of the patients had co-morbidities, and 100% were classified as having no co-morbidities. A retrospective investigation was carried out by Vijay et al. Conducted a cohort of dengue patients from our state in India, except that this time the participants were adult city dwellers. Furthermore, 15.3% of the patients exhibited signs of ascites from a plasma leak, 47.6% of the patients had a hematocrit of more than 40%, and 77 percent of the patients had a platelet count of less than '100,000/cu.mm'. [11]. Gallagher et al. [12] identified four important pathways by which obesity may impact dengue infection. First, obesity reduces AMP-Protein Kinase (AMPK) activity, resulting in the accumulation of lipids in the endoplasmic reticulum, which promotes viral propagation.

The most often reported symptom was stomach discomfort (33.33%), followed by dyspnea (30%), fever (20%), and skin rash (16.67%). Hepatic dysfunction was the most common consequence (30%), followed by multi-organ failure (25%), renal failure (20%), encephalopathy (13.33%), and acute respiratory distress syndrome (11.67%). According to Ranganathan et al. [13], liver damage may arise from toxicity caused by the use of paracetamol or other medications to treat the acute phase of dengue. The authors drew their results from a study of 25 infants with fulminant hepatic failure who were given large doses of paracetamol to treat acute viral infections. Our results show the tremendous burden of both symptoms and serious consequences associated with dengue fever in this patient population. Tamibmaniam et al. utilized simple logistic regression to predict severe dengue using the 2009 WHO criteria [14]. They found three parameters: vomiting, skin rash, and abdominal discomfort.

In our research, 36.67% were serologically positive, with 16.67% testing positive for NS1 Ag and

another 16.67% for both IgM and IgG antibodies. Meanwhile, 30% of the patients were serologically negative. This data shows that a large number of patients were proven to have dengue using serological testing, but a smaller fraction did not have positive serological findings. Arshad et al. examined 34% of patients were positive for IgG or IgM after completing antigen and antibody testing, while 85.5% of patients tested positive for the NS1 antigen. A reduced risk of bleeding was seen in those who tested positive for both dengue-specific antibodies (31.2%). Hemorrhage was linked to thrombocytopenia, and blood product infusions increased these patients' chances of survival [15]. Lima et al. [16] found an inverse and substantial correlation between circulating total cholesterol and low-density lipoprotein cholesterol levels and dengue severity, suggesting these parameters may be used as routine indicators.

Conclusion

Dengue is one of the primary causes of dedifferentiated fever. It is rarely recognized as a clinical entity by primary health care physicians, despite its exceedingly broad wellness presentation. In areas where dandy fever was widespread, this study supports further investigations into the use of intervention techniques to improve diagnostic accuracy and precision at the first treatment level. The importance of broken bone fever to physicians was emphasized in this research in relation to medical specialization, symptoms, complications, and wellness results.

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