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Clinical Profile, Treatment Outcome, and Predictors of Mortality in Dengue Patients Admitted During Epidemic Season

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Abstract

Introduction: Dengue fever is a mosquito-borne viral illness that poses a major public health challenge, particularly during seasonal epidemics in endemic regions. It presents a wide spectrum of clinical manifestations, ranging from mild febrile illness to life-threatening complications such as severe plasma leakage, bleeding, and organ impairment. This study aims to analyze the clinical profile, treatment outcomes, and key predictors of mortality among dengue patients admitted during an epidemic season.

Methods: This prospective observational study was conducted at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh over six months from July to December 2024, during the peak dengue epidemic season. A total of 107 adult patients (≥18 years) admitted with confirmed dengue infection were included. Data were analyzed using SPSS version 26.0. A p-value <0.05 was considered statistically significant.

Result: Among 107 dengue patients, most were young males with common symptoms like fever, myalgia, and headache. Thrombocytopenia, leukopenia, and elevated liver enzymes were frequent lab findings. While 57% had uncomplicated dengue, 12.1% developed severe disease. Platelet transfusion was needed in 26.2%, ICU care in 11.2%, with a recovery rate of 94.4% and 5.6% mortality. Bleeding manifestations and SGPT >100 IU/L were independent predictors of mortality.

Conclusion: Most patients exhibited thrombocytopenia, leukopenia, and elevated liver enzymes, indicating hematological and hepatic involvement. While over half had uncomplicated dengue, nearly one-third developed warning signs and 12.1% progressed to severe dengue. Treatment outcomes were favorable in most cases, with a recovery rate of 94.4% and a mortality rate of 5.6%. Multivariate analysis identified bleeding manifestations and markedly elevated SGPT levels (>100 IU/L) as independent predictors of mortality.

Keywords: Dengue Fever; Clinical Profile; Treatment Outcome; Epidemic Season

Introduction

Dengue is a mosquito-borne viral infection that has emerged as one of the most significant public health challenges in tropical and subtropical regions, particularly in Southeast Asia, South America, and parts of

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Africa. It is caused by the dengue virus (DENV), which has four serotypes (DENV-1 to DENV-4), all of which can cause a range of clinical manifestations from mild febrile illness to severe life-threatening diseases such as dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) [1,2]. Over the past two decades, the global burden of dengue has escalated dramatically. According to the World Health Organization (WHO), the incidence of dengue has increased by over eight-fold between 2000 and 2019, with an estimated 390 million infections occurring annually, of which approximately 96 million manifest clinically [3,4]. Bangladesh has experienced recurrent outbreaks, especially during the monsoon and post-monsoon periods, with seasonal epidemics causing significant morbidity and mortality [5]. The clinical presentation of dengue varies widely depending on the phase of illness, serotype, host immune status, and presence of comorbidities. While fever, headache, retro-orbital pain, myalgia, and rash are common early features, complications such as plasma leakage, bleeding diathesis, and multiorgan failure can develop in severe cases [6,7]. The 2009 WHO classification, later updated in 2012, categorizes dengue into three groups: dengue without warning signs, dengue with warning signs, and severe dengue, which has improved the triage and management of cases [8]. Despite advances in supportive care, mortality in severe dengue remains a concern, especially in resource-limited settings. Identifying early predictors of poor outcomes is crucial for timely intervention and optimal resource utilization. Several studies have reported that bleeding manifestations, hypotension, elevated liver enzymes, high hematocrit, and severe thrombocytopenia are significantly associated with mortality [9–11]. However, these associations may vary across populations and healthcare systems. During the epidemic season from July to December 2024, Bangladesh witnessed a surge in dengue admissions, particularly in urban and semi-urban hospitals. This seasonal outbreak highlighted the pressing need to revisit the clinical spectrum, laboratory parameters, treatment responses, and predictors of mortality to guide evidence-based clinical practice. Previous studies conducted in neighboring countries and within Bangladesh have provided insights into dengue pathophysiology and outcomes, yet variability in presentations across outbreaks warrants continued surveillance [12,13]. This study aims to assess the clinical profile, treatment outcomes, and predictors of mortality among patients admitted with dengue infection during the 2024 epidemic season. By systematically evaluating a cohort of hospitalized dengue patients, we aim to contribute to the growing body of regional evidence on dengue epidemiology and clinical management.

Methods

This prospective observational study was conducted at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh over six months from July to December 2024, during the peak dengue epidemic season. A total of 107 adult patients (≥18 years) admitted with confirmed dengue infection—diagnosed via NS1 antigen and/or IgM ELISA—were included. Patients with co-infections (e.g., malaria, COVID-19), chronic liver disease, hematological disorders, autoimmune conditions, or incomplete hospital records were excluded. Data were collected using a structured case record form, covering demographic details, clinical features (e.g., fever, rash, bleeding, hypotension), laboratory findings (platelet count, leukocyte count, hematocrit, SGPT, SGOT), treatment interventions (fluid therapy, platelet transfusion, ICU admission), and outcomes (recovery or death). Patients were classified according to the WHO 2009 dengue case definitions into dengue without warning signs, dengue with warning signs, and severe dengue. Key definitions included thrombocytopenia as platelet count <100,000/mm³, leukopenia as WBC <4,000/mm³, elevated liver enzymes as SGPT or SGOT >40 IU/L, and hypotension as systolic BP <90 mmHg. Data were analyzed using SPSS version 26.0. Categorical variables were expressed as frequencies and percentages; continuous variables as means with standard deviations. Chi-square or Fisher's exact tests were used for categorical comparisons and Independent Samples t-tests were for continuous data. Univariate logistic regression was performed to identify potential predictors of mortality, followed by multivariate logistic regression to determine independent predictors. A p-value <0.05 was considered statistically significant. Ethical approval was obtained from the institutional ethics committee and informed written consent was secured from all participants or their legal representatives.

Results

Table 1: Distribution of patients by demographic and clinical features of dengue patients (n = 107).

Variable	Frequency (%)
Age (mean ± SD)	31.8 ± 12.4 years
Male	65 (60.7%)
Fever	99 (92.5%)
Myalgia	73 (68.2%)
Headache	68 (63.6%)
Retro-orbital pain	43 (40.2%)
Nausea/Vomiting	47 (43.9%)
Abdominal Pain	35 (32.7%)
Bleeding Manifestations	21 (19.6%)
Hepatomegaly	17 (15.9%)

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Among the 107 patients, the mean age was 31.8 ± 12.4 years, with a male predominance (60.7%). Fever was the most frequent symptom (92.5%), followed by myalgia (68.2%) and headache (63.6%). Retro-orbital pain occurred in 40.2%, nausea/vomiting in 43.9%, abdominal pain in 32.7%, bleeding in 19.6%, and hepatomegaly in 15.9% of cases.

Table 2: Distribution of patients by laboratory findings on admission (n=107).

Parameter	Value / Frequency (%)
Platelet count <100,000/mm³	96 (89.7%)
Platelet count <50,000/mm³	44 (41.1%)
Leukopenia (<4000/mm³)	67 (62.6%)
Hematocrit >45%	63 (58.8%)
Elevated SGPT (>40 IU/L)	57 (53.3%)
Elevated SGOT (>40 IU/L)	61 (57.0%)

Thrombocytopenia was present in 89.7% of patients, with 41.1% having platelet counts below 50,000/mm³. Leukopenia was seen in 62.6% and elevated hematocrit (>45%) in 58.8%. SGPT and SGOT were raised in 53.3% and 57.0% of patients respectively, indicating hepatic involvement.

Table 3: Distribution of patients by classification of dengue severity (n=107).

WHO Classification	Frequency (%)
Dengue without warning signs	61 (57.0%)
Dengue with warning signs	33 (30.8%)
Severe dengue	13 (12.1%)

Based on the WHO classification, 61 patients (57.0%) had dengue without warning signs, 33 patients (30.8%) had dengue with warning signs, and 13 patients (12.1%) developed severe dengue.

Table 4: Distribution of patients by treatment and outcomes (n=107)

Treatment/Outcome Parameter	Frequency (%)
Platelet transfusion	28 (26.2%)
ICU admission	12 (11.2%)
Duration of hospital stay	5.4 ± 2.1 days
Complete recovery	101 (94.4%)
Mortality	6 (5.6%)

Platelet transfusion was administered to 28 patients (26.2%), and ICU care was required in 12 cases (11.2%). The average hospital stay was 5.4 ± 2.1 days. Recovery was achieved in 101 patients (94.4%), while mortality occurred in 6 cases (5.6%).

On multivariate analysis, bleeding manifestations (OR 4.6, p=0.018) and SGPT >100 IU/L (OR 3.9, p=0.024) were significant independent predictors of mortality. Although low platelet count, high hematocrit, and hypotension were significant in univariate analysis, they did not retain significance in multivariate models.

Table 5: Distribution of patients by predictors of mortality (univariate and multivariate analysis) (n=107).

Variable	p-value (Univariate)	Adjusted OR (95% CI)	p-value (Multivariate)
Platelet <20,000/mm³	0.031	2.3 (0.9–5.6)	0.083
Hematocrit >50%	0.044	2.0 (0.7–5.1)	0.112
Bleeding manifestations	0.007	4.6 (1.3–15.9)	0.018*
SGPT >100 IU/L	0.012	3.9 (1.2–12.8)	0.024*
Hypotension at admission	0.02	2.8 (1.0–7.5)	0.057

Discussion

Our study evaluated the clinical profile, laboratory findings, treatment outcomes, and predictors of mortality among 107 dengue patients admitted during the epidemic season. The demographic and clinical features demonstrated a mean age of 31.8 ± 12.4 years and a male predominance (60.7%). These findings are in concordance with Hasan et al. [14] and Rahman et al. [15], who reported a similar age distribution and higher male involvement in dengue outbreaks in Bangladesh. The high frequency of fever (92.5%), myalgia (68.2%), and headache (63.6%) observed in our cohort aligns with a previous study by Simmons et al. [2] that identified these as hallmark symptoms of dengue infection. Similarly, the prevalence of retro-orbital pain, nausea/vomiting, abdominal pain, bleeding manifestations, and hepatomegaly paralleled findings from Malavige et al. [6] and Martina et al. [7], underscoring the common clinical presentation of dengue. Laboratory findings revealed that a majority of patients (89.7%) presented with thrombocytopenia, with 41.1% showing severe reduction in platelet count (<50,000/mm³). Leukopenia was found in 62.6% of cases, and increased hematocrit was noted in 58.8% of patients, reflecting hemoconcentration. Elevated liver enzymes (SGPT in 53.3% and SGOT in 57.0%) suggest a degree of hepatic involvement, which is consistent with the findings reported by Yacoub and Wills [11] and Chacko and Subramanian [10]. These laboratory abnormalities have been widely recognized as indicators of the severity of dengue infection and are essential in guiding clinical management. The classification of dengue severity using the WHO criteria showed that 57.0% of patients had dengue without warning signs, 30.8% with warning signs, and 12.1% developed severe dengue. These proportions are comparable to the distributions reported in a study by Srikiatkhachorn et al. [9] which highlights the variable spectrum of dengue severity even within epidemic settings. The relatively lower percentage of severe dengue in

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our study may be reflective of early intervention or variations in serotype virulence, similar to observations made by Bhatt et al [4]. Treatment and outcome data indicated that 26.2% of patients required platelet transfusion and 11.2% needed ICU admission, with an average hospital stay of 5.4 ± 2.1 days. The overall recovery rate was high at 94.4%, with a mortality rate of 5.6%. These outcomes are in line with the studies by Hossain et al. [5] and Roy et al. [16], who documented favorable recovery trends in similar epidemic conditions while also noting the challenges in managing severe cases. The mortality rate, although low, underscores the need for vigilant monitoring especially in patients exhibiting critical laboratory and clinical features. Predictors of mortality were explored using both univariate and multivariate analyses. While several factors, including low platelet count, high hematocrit, and hypotension, were significant in univariate analysis, only bleeding manifestations (OR 4.6, p=0.018) and SGPT >100 IU/L (OR 3.9, p=0.024) remained significant in the multivariate model. These findings are consistent with the observations of Chacko and Subramanian [10] and Yacoub [11], who similarly identified bleeding and hepatic dysfunction as critical determinants of poor outcomes in dengue patients. In contrast, a study by Murray et al. [17] has emphasized additional factors such as age and comorbidities; however, in our cohort, these variables did not retain statistical significance, possibly due to the relatively young age of the participants and the exclusion of patients with significant comorbid conditions.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion

Most patients exhibited thrombocytopenia, leukopenia, and elevated liver enzymes, indicating hematological and hepatic involvement. While over half had uncomplicated dengue, nearly one-third developed warning signs and 12.1% progressed to severe dengue. Treatment outcomes were favorable in most cases, with a recovery rate of 94.4% and a mortality rate of 5.6%. Multivariate analysis identified bleeding manifestations and markedly elevated SGPT levels (>100 IU/L) as independent predictors of mortality.

Recommendation

Based on the findings, it is recommended that clinicians closely monitor dengue patients presenting with bleeding manifestations and significantly elevated SGPT levels, as these are strong predictors of mortality. Early identification and prompt management of such high-risk cases can improve outcomes and reduce mortality during dengue outbreaks.

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