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Evaluating the Effectiveness of Fluid Therapy and Symptomatic Management in Case of Dengue Viral Fever

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Abstract **Original Research Article**

Background: Dengue is a viral infection predominantly found in tropical regions, caused by the dengue virus and transmitted to humans through the bites of Aedes aegypti and Aedes albopictus mosquitoes. The purpose of this study is to evaluate the effectiveness of fluid therapy and symptomatic management in patients with dengue viral fever. ***Methods:*** This retrospective observational study at the Department of Internal Medicine, Dhaka Medical College Hospital (DMCH), Bangladesh (July 2023–June 2024), included 160 dengue patients. Baseline clinical and laboratory data were recorded, and patients received oral, IV, or combined fluid therapy per WHO protocols. Outcomes included hemodynamic stabilization, laboratory changes, symptom improvement, complications, hospital stay, and final recovery. Data were analyzed with SPSS 26.0 using chi-square and ANOVA, with $p < 0.05$ considered significant. ***Results:*** In 160 dengue patients, most were febrile (70%). IV fluids were used in 55.6%, oral in 30%, and combined in 14.4%, with stabilization rates of 83.3%, 91.0%, and 95.6%. Hematocrit, platelets, and lactate improved significantly within 48 hours. Complications were low (plasma leakage 11.3%). Mean hospital stay was 4.6 days, and 96.9% achieved full recovery with no mortality. ***Conclusion:*** Effective and phase-appropriate fluid therapy combined with symptomatic management resulted in rapid stabilization and overwhelmingly favorable recovery outcomes in patients with dengue viral fever.

Keywords: Fluid Therapy, Symptomatic Management, Dengue Fever.

INTRODUCTION

Dengue is a viral infection predominantly found in tropical regions, caused by the dengue virus. The disease is transmitted to humans through the bites of *Aedes aegypti* and *Aedes albopictus* mosquitoes [1,2]. As a mosquito-borne viral illness, dengue represents a significant public health challenge globally, particularly in tropical and subtropical areas [3]. Over recent decades, the incidence of dengue has risen sharply [4], with approximately 390 million infections occurring annually across 128 countries, making it a major health concern in endemic regions [5,6].

Clinically, dengue presents with a broad spectrum of manifestations, ranging from mild illness manageable on an outpatient basis to severe disease characterized by plasma leakage, often necessitating hospitalization [1,7]. Dengue fever is an acute febrile illness with symptoms including headache, musculoskeletal pain, myalgia, leukopenia, and thrombocytopenia [8]. In severe cases, plasma leakage can lead to reduced intravascular volume, precipitating hypovolemic shock and potentially causing organ hypoperfusion and multi-organ failure if not managed promptly [9]. Although most patients recover from a self-limiting febrile illness, a minority progress to

dengue shock syndrome, which can be life-threatening [4].

In the absence of specific antiviral therapy, supportive care with careful fluid management remains the cornerstone of treatment for dengue hemorrhagic fever, particularly during the critical phase to minimize mortality. Fluid therapy is crucial in determining outcomes for patients in severe stages of the disease [10]. Intravenous fluids are categorized as crystalloids, which contain electrolytes such as calcium, potassium, sodium, and chloride, and colloids, which include larger molecules that maintain intravascular volume for longer periods. Uncontrolled fluid loss disrupts normal fluid and electrolyte balance, increasing vascular permeability and promoting capillary leakage, which can lead to hypovolemic shock if not addressed in time [11]. Oral hydration with electrolyte solutions, oral rehydration fluids, fruit juices, or coconut water is recommended, while intravenous administration typically involves normal saline to restore circulating volume [12].

Despite the critical role of fluid therapy and symptomatic management in dengue, there remains considerable uncertainty regarding the optimal type, volume, and timing of fluids, particularly in adult patients. Most existing guidelines are based on pediatric data or expert consensus, and there is limited evidence from observational studies or clinical trials assessing outcomes in adults. Moreover, while oral and intravenous fluids are widely recommended, the comparative effectiveness of these approaches in achieving hemodynamic stabilization, improving laboratory parameters, and reducing complications is not well defined. Similarly, data on the impact of adjunct symptomatic management, such as paracetamol and antiemetics, on patient recovery and hospital stay remain scarce. Addressing these gaps is essential for optimizing patient care and minimizing morbidity associated with dengue infection. Therefore, the purpose of this study is to evaluate the effectiveness of fluid therapy and symptomatic management in patients with dengue viral fever.

Objective

- To evaluate the effectiveness of fluid therapy and symptomatic management in patients with dengue viral fever.

METHODOLOGY & MATERIALS

This retrospective observational study was conducted in the Department of Internal Medicine, Dhaka Medical College Hospital (DMCH), Bangladesh, from July 2023 to June 2024. A total of 160 patients diagnosed with dengue viral fever were included based on predefined inclusion and exclusion criteria. Data were collected to evaluate the effectiveness of fluid therapy and symptomatic management across different clinical phases of dengue.

Inclusion Criteria:

- Patients aged ≥18 years diagnosed with dengue viral fever based on NS1 antigen or IgM positivity.
- Patients requiring fluid therapy and/or symptomatic management during hospitalization.
- Patients who provided informed consent for participation.

Exclusion Criteria:

- Patients with chronic liver, kidney, or cardiac diseases affecting fluid balance.
- Pregnant or lactating women.
- Patients with co-infections (e.g., malaria, typhoid) or other acute febrile illnesses.
- Patients with incomplete medical records or who left the hospital against medical advice.

Baseline demographic and clinical data—including age, sex, presenting symptoms, and clinical phase at admission—were recorded at enrollment, and laboratory parameters (hematocrit, platelet count, and serum lactate) were documented at baseline and after 48 hours of treatment. Patients were managed according to WHO-guided dengue protocols and classified into three groups based on fluid therapy: oral fluids only, intravenous (IV) crystalloids only, and combined oral + IV therapy. Total fluid volume, duration of IV therapy, and adjunct symptomatic treatments (paracetamol, antiemetics) were recorded.

The primary outcome was hemodynamic stabilization, assessed by improvement in blood pressure, pulse pressure, capillary refill, and clinical perfusion. Secondary outcomes included changes in hematocrit, platelet count, and serum lactate at 48 hours, symptomatic improvement at 24 hours, occurrence of complications (plasma leakage, bleeding, severe dengue, fluid overload), length of hospital stay, and final clinical outcomes (recovery, ICU requirement, mortality).

Data were analyzed using SPSS version 26.0. Categorical variables were expressed as frequencies and percentages, while continuous variables were reported as mean ± standard deviation or median with interquartile range. Group differences were evaluated using chi-square tests for categorical variables and ANOVA for continuous variables, with $p < 0.05$ considered statistically significant.

RESULTS

Table 1: Baseline Characteristics of the Study Population (n = 160)

Variable		n	%
Age (years)	18–30	74	46.30%
	31–45	54	33.80%
	46–60	26	16.30%
	>60	6	3.80%
	Mean ± SD	32.7 ± 14.2	
Gender	Male	85	53.10%
	Female	75	46.90%
Clinical Phase at Admission	Febrile phase	112	70.00%
	Critical phase	48	30.00%
	Recovery phase	0	0.00%
Common Symptoms	Fever	160	100.00%
	Headache	148	92.50%
	Myalgia	142	88.80%
	Nausea/Vomiting	67	41.90%
	Abdominal pain	52	32.50%

Table 1 presents the baseline characteristics of the 160 patients. The mean age was 32.7 ± 14.2 years, with most patients aged 18–30 years (74 patients, 46.30%), followed by 31–45 years (54 patients, 33.80%), 46–60 years (26 patients, 16.30%), and >60 years (6 patients, 3.80%). Males accounted for 85 patients (53.10%) and females 75 patients (46.90%). Most patients were admitted in the febrile phase (112 patients, 70.00%) and 48 patients (30.00%) in the critical phase. Fever was present in all patients (160 patients, 100.00%), with headache (148 patients, 92.50%), myalgia (142 patients, 88.80%), nausea/vomiting (67 patients, 41.90%), and abdominal pain (52 patients, 32.50%) being the most common associated symptoms.

Table 2: Fluid Therapy Patterns and Requirements in Dengue Patients (n = 160)

Parameter	n	%
Oral fluids only	48	30.00%
IV crystalloids only	89	55.60%
Combined oral + IV	23	14.40%
Duration of IV fluid therapy (hours), median [IQR]	48 [36 - 72]	
Total fluid volume in first 48 hours (mL/kg), mean ± SD	65.5 ± 18.3	

The majority of patients received IV crystalloids only (89 patients, 55.60%), followed by oral fluids only (48 patients, 30.00%), and a smaller proportion received combined oral and IV therapy (23 patients, 14.40%). The median duration of IV fluid therapy was 48 hours (interquartile range 36–72 hours), and the mean total fluid volume administered in the first 48 hours was 65.5 ± 18.3 mL/kg.

Table 3: Hemodynamic Stabilization Outcomes Among Different Fluid Therapy Groups

Group	Hemodynamic Stabilization Achieved	Median Time
Oral only	40/48 (83.3%)	12 hours
IV crystalloids	81/89 (91.0%)	8 hours
Combined	22/23 (95.6%)	6 hours

Hemodynamic stabilization varied across the three fluid therapy groups. Patients receiving only oral fluids achieved stabilization in 40 out of 48 cases (83.3%), with a median time of 12 hours. Those treated with IV crystalloids showed a higher stabilization rate of 81 out of 89 patients (91.0%), with a shorter median time of 8 hours. The combined oral and IV fluid group demonstrated the highest success rate, with 22 out of 23 patients (95.6%) achieving stabilization, and the fastest median recovery time of 6 hours.

Table 4: Changes in Key Laboratory Parameters Following 48 Hours of Management

Parameter	Baseline (Mean ± SD)	48 Hours (Mean ± SD)	p-value
Hematocrit (%)	44.5 ± 5.1	40.1 ± 4.2	<0.001
Platelet count ($\times 10^9$/L)	85.2 ± 31.5	105.8 ± 45.6	<0.001
Serum lactate (mmol/L)	2.1 ± 0.8	1.5 ± 0.4	<0.001

Table 4 shows significant laboratory improvements over the first 48 hours of treatment. Hematocrit decreased from 44.5 ± 5.1% at baseline to 40.1 ± 4.2%, indicating resolution of hemoconcentration. Platelet count increased from 85.2 ± 31.5 $\times 10^9$/L to 105.8 ± 45.6 $\times 10^9$/L, reflecting hematologic recovery. Serum lactate levels also declined from 2.1 ± 0.8 mmol/L to 1.5 ± 0.4 mmol/L, demonstrating improved tissue perfusion. All changes were statistically significant ($p < 0.001$).

Table 5: Symptomatic Management Outcomes Across Fluid Therapy Groups (n = 160)

Outcome	Oral Only (n = 48)	IV Only (n = 89)	Combined (n = 23)	p-value
Symptomatic improvement at 24 hrs	45 (93.8%)	75 (84.3%)	21 (91.3%)	0.230
Mean Paracetamol doses (first 72 hrs)	5.2 ± 2.1	7.5 ± 2.8	6.8 ± 2.5	<0.001
Antiemetic requirement	8 (16.7%)	45 (50.6%)	12 (52.2%)	<0.001

Symptomatic improvement at 24 hours was observed in 93.8% of the oral-only group, 84.3% of the IV-only group, and 91.3% of the combined group ($p = 0.230$). The oral-only group required the fewest paracetamol doses over 72 hours (5.2 ± 2.1) compared to 7.5 ± 2.8 in IV-only and 6.8 ± 2.5 in combined therapy ($p < 0.001$). Antiemetic use was lowest in the oral-only group (16.7%) versus 50.6% in IV-only and 52.2% in combined therapy ($p < 0.001$).

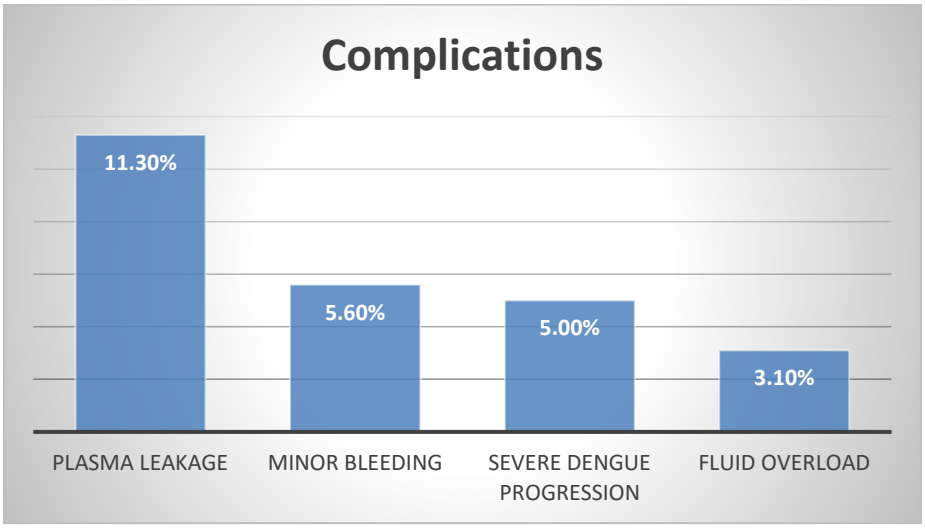

Figure 1: Frequency of Complications Among Dengue Patients (n = 160)

Plasma leakage was the most common complication, occurring in 18 patients (11.3%), followed by minor bleeding (9 patients, 5.6%), severe dengue progression (8 patients, 5.0%), and fluid overload (5 patients, 3.1%).

Table 6: Hospital Stay and Final Clinical Outcomes in Dengue Patients (n = 160)

Outcome		n	%
Length of hospital stay	Oral only	3.5 ± 1.1	
	IV only	5.2 ± 1.6	
	Combined	4.8 ± 1.4	
	Overall mean stay	4.6 ± 1.6	
Final Clinical Outcome	Full recovery	155	96.90%
	Required ICU monitoring	5	3.10%
	Mortality	0	0.00%

The length of hospital stays varied by treatment group, with a mean of 3.5 ± 1.1 days for oral-only patients, 5.2 ± 1.6 days for IV-only, and 4.8 ± 1.4 days for the combined therapy group, resulting in an overall mean stay of 4.6 ± 1.6 days. Final clinical outcomes were favorable, with 155 patients (96.9%) achieving full recovery, 5 patients (3.1%) requiring ICU monitoring, and no deaths reported.

DISCUSSION

Dengue viral fever is an acute mosquito-borne illness that can range from a self-limiting febrile condition to severe disease with plasma leakage and hemodynamic instability. Hemodynamic stabilization and supportive care, particularly through judicious fluid therapy and symptomatic management, serve as key indicators of clinical recovery and overall treatment

effectiveness. The findings of this study demonstrate that tailored fluid therapy, whether oral, intravenous, or combined, is associated with timely hemodynamic stabilization, improvement in hematologic and metabolic parameters, and favorable clinical outcomes. These results highlight the critical role of early assessment and appropriate selection of fluid therapy and symptomatic management strategies in optimizing recovery and minimizing complications in patients with dengue viral fever.

The baseline characteristics of our study population (n = 160) demonstrate a predominance of young adults, with the highest proportion in the 18–30 years age group (46.30%) and a mean age of 32.7 ± 14.2 years, which is comparable to findings reported by Khan *et al.*,[13] (31.5 ± 12.2 years) and Yesmin *et al.*,[14] (~33.3 ± 14 years), and aligns with Pulock *et al.*,[15], where a substantial proportion of cases were among individuals aged 16–25 years and 26–40 years. Male patients accounted for 53.10% of our cohort, reflecting a slight male predominance, similar to the patterns observed by Pulock *et al.*,[15] (≈66.6% male) and Yesmin *et al.*,[14] (~59.9% male). Clinically, most patients in our study presented during the febrile phase (70.00%), with fever being universal (100%), followed by headache (92.50%) and myalgia (88.80%), which closely mirrors the high prevalence of these symptoms in Khan *et al.,* (fever 100%, headache 98.4%, myalgia 86.7%) and Pulock *et al.,* [15] (fever 99.5%, headache and abdominal tenderness common). Gastrointestinal manifestations, including nausea/vomiting (41.90%) and abdominal pain (32.50%), were also observed, consistent with the reports by Khan *et al.*,[13] (vomiting 74.7%, abdominal pain 74.3%) and Yesmin *et al.*,[14] (persistent vomiting and abdominal pain frequent). Overall, the demographic and symptom profiles in our cohort are largely consistent with previous studies, underscoring the characteristic clinical presentation of dengue viral fever in young adults with a slight male predominance.

Regarding fluid therapy, IV crystalloids alone were administered to 55.6% of patients, oral fluids only to 30%, and combined oral and IV therapy to 14.4%. The median duration of IV therapy was 48 hours (IQR 36–72), with a mean total fluid volume of 65.5 ± 18.3 mL/kg in the first 48 hours. These patterns align with Madanayake *et al.*,[9], who reported that 85.2% of dengue hemorrhagic fever patients received crystalloids alone, and Kularatne *et al.*,[16], who showed that critical-phase patients required significantly higher fluid volumes. This underscores the central role of intravenous crystalloids, with fluid volume and duration reflecting disease severity.

Hemodynamic stabilization outcomes further highlight the importance of adequate fluid management. Oral-only patients achieved stabilization in 83.3% of cases (median 12 hours), IV-only patients in 91% (median 8 hours), and the combined group in 95.6% (median 6 hours). These findings are consistent with Madanayake *et al.*,[9], who emphasized the variability of fluid requirements during the critical phase and the need for sufficient IV therapy to maintain circulatory stability. Combined oral and IV therapy demonstrated the highest stabilization rate and shortest recovery time, suggesting that augmenting oral intake with IV fluids may benefit patients showing early hemodynamic compromise.

Laboratory monitoring revealed significant improvements over the first 48 hours. Hematocrit decreased from 44.5 ± 5.1% to 40.1 ± 4.2%, platelet counts increased from $85.2 \pm 31.5 \times 10^9$/L to $105.8 \pm 45.6 \times 10^9$/L, and serum lactate declined from 2.1 ± 0.8 mmol/L to 1.5 ± 0.4 mmol/L (all $p < 0.001$), indicating resolution of hemoconcentration, early hematologic recovery, and improved tissue perfusion. These trends align with Rahat *et al.*,[17], who reported elevated hematocrit (47%) and thrombocytopenia (66.8%) in dengue patients, and Karniawan *et al.*,[18], who observed significant temporal changes in hematocrit ($p = 0.002$) and platelet count ($p = 0.000$) during the critical phase, supporting the physiological plausibility of the observed improvements.

Symptomatic management outcomes showed that oral-only patients had the highest improvement at 24 hours (93.8%) compared to IV-only (84.3%) and combined therapy (91.3%), though differences were not statistically significant. The oral-only group required fewer paracetamol doses (5.2 ± 2.1 vs. 7.5 ± 2.8 for IV-only and 6.8 ± 2.5 for combined therapy, $p < 0.001$) and had lower antiemetic use (16.7% vs. 50.6% and 52.2%, $p < 0.001$). These findings are consistent with Nainggolan *et al.*,[19], who reported that oral isotonic fluids improved gastrointestinal symptoms, fluid balance, and defervescence, emphasizing the importance of early and adequate oral hydration for symptomatic relief.

Complications were uncommon: plasma leakage occurred in 18 patients (11.3%), minor bleeding in 9 (5.6%), severe dengue progression in 8 (5.0%), and fluid overload in 5 (3.1%). These rates are comparable to Thomas *et al.*,[20], who reported plasma leakage in 17% of adult dengue patients, highlighting that while complications are relatively infrequent, plasma leakage and hemorrhagic events remain clinically relevant and warrant monitoring.

Hospital stay varied by treatment group, with a mean of 3.5 ± 1.1 days for oral-only patients, 5.2 ± 1.6 days for IV-only, and 4.8 ± 1.4 days for combined therapy, resulting in an overall mean stay of 4.6 ± 1.6 days. Final outcomes were favorable, with 155 patients (96.9%) achieving full recovery, 5 patients (3.1%) requiring ICU monitoring, and no mortality observed. These findings align with Khalil *et al.*,[21], who reported a mean hospital stay of 3.46 ± 3.45 days and low mortality (~1.5%), and Mauleti *et al.*,[22], who observed

a mean stay of 4.7 ± 1.6 days, reinforcing the effectiveness of the fluid therapy and symptomatic management strategies employed while highlighting the influence of patient-specific factors on hospital stay.

Limitations of the study

This study had some limitations:

- The study population was relatively small, limiting generalizability.
- The sample was not randomly selected.
- The study's limited geographic scope may introduce sample bias, potentially affecting the broader applicability of the findings.

CONCLUSION

Dengue viral fever requires timely supportive care, and this study shows that appropriate fluid therapy together with symptomatic management leads to consistently favorable outcomes. Patients receiving oral, IV, or combined fluids demonstrated effective stabilization, accompanied by clear improvements in key laboratory markers and symptom relief within the initial treatment period. Complications were generally limited, and clinical recovery was overwhelmingly positive, with only a small proportion needing advanced monitoring. Overall, the findings reinforce that structured fluid management—tailored to clinical phase and patient needs—remains a highly effective cornerstone of dengue treatment.

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