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# Integrative Approach to Dengue Hemorrhagic Fever: Clinical Management and Preventive Strategies

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### Abstract

Dengue Hemorrhagic Fever (DHF) is a viral disease transmitted by *Aedes aegypti* mosquitoes, presenting with a wide spectrum of clinical manifestations ranging from mild fever to severe complications such as bleeding and shock. This case report describes a 12-year-old patient who presented to the Satellite Inpatient Health Center Bandar Lampung with a three-day history of high fever, headache, joint pain, skin rash, and nausea, accompanied by a positive history of mosquito bites in a dengue-endemic area. A holistic diagnostic approach was applied, including clinical history, physical examination, and symptomatic assessment. The patient was managed with fluid therapy consisting of 1500 ml oral fluids within six hours and intravenous infusion of Ringer Lactate solution (500 cc at a rate of 20 drops per minute). Preventive measures included hospitalization for observation, avoidance of mosquito bites through nets and protective clothing, fogging, and environmental sanitation. Pharmacological therapy was prescribed, including paracetamol 500 mg three times daily, ambroxol 30 mg twice daily, vitamin C 500 mg once daily, antacid 30 ml three times daily, intravenous fluids 500 cc at 20 tpm, ranitidine 150 mg twice daily, and domperidone 10 mg twice daily. Physical examination revealed a body temperature of 39°C, petechial rash, and joint tenderness, while other parameters were within normal limits. The patient reported no history of vomiting, smoking, or alcohol consumption. Following intervention, fever and pain subsided, skin rash improved, and overall clinical condition stabilized. Preventive measures were effective in reducing mosquito exposure, while supportive therapy minimized the risk of complications. This case confirms that *Aedes aegypti* mosquito bites caused dengue virus infection in the patient, and demonstrates that a holistic management strategy combining pharmacological therapy, fluid replacement, preventive measures, and psychosocial support can effectively reduce symptoms and prevent complications. The novelty of this report lies in its integrative approach, emphasizing early recognition and comprehensive management as essential strategies to improve patient outcomes and reduce the burden of dengue in endemic areas.



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## 1. Introduction

Dengue Hemorrhagic Fever (DHF) is an acute febrile illness caused by infection with the dengue virus (DENV), which consists of four distinct serotypes: DENV-1, DENV-2, DENV-3, and DENV-4. Transmission occurs through the bite of female *Aedes* mosquitoes, primarily *Aedes aegypti* and *Aedes albopictus*, which are most active during the morning and evening (WHO, 2022). Globally, dengue is recognized as one of the fastest-spreading mosquito-borne viral diseases, with more than 7.6 million cases reported to WHO by April 2024, including 16,000 severe cases and over 3,000 deaths (WHO, 2024). Asia contributes approximately 70% of the global burden, making dengue a major public health challenge (Parveen et al., 2023).

Clinically, dengue fever is characterized by a sudden onset of high fever lasting 2–7 days, often accompanied by abdominal pain, arthralgia, myalgia, anorexia, and in severe cases, hemorrhagic manifestations (WHO, 2012). The disease is prevalent in tropical and subtropical regions and has the potential to cause outbreaks, especially during periods of increased rainfall that enhance mosquito vector activity (Awalussiyam & Hendrati, 2024). In Indonesia, dengue remains a significant health concern. Reported cases increased from 73,518 in 2021 to 143,266 in 2022, followed by a slight decrease to 114,720 in 2023. However, by the 22nd week of 2024, the number of cases had risen again to 119,709, surpassing the figures from the same period in the previous year (Ministry of Health of the Republic of Indonesia, 2024).

Lampung Province is among the regions with relatively high incidence, recording 1,460 cases and four deaths in 2021, ranking twelfth nationally (Ministry of Health of the Republic of Indonesia, 2021). The pathophysiology of dengue infection begins when the virus enters the body through a mosquito bite and infects monocytes, which are part of the innate immune system. These cells produce interferons to suppress

viral replication; however, massive replication overwhelms this defense, leading to pyrogen release, fever, and rash (Saputra, 2023). Severe dengue is often associated with immunopathological mechanisms. Antibody-dependent enhancement (ADE) occurs when non-neutralizing antibodies from a previous infection facilitate viral entry into monocytes, increasing viral replication and disease severity (Teo et al., 2023).

Viral proteins play a central role in disease progression. The envelope (E), precursor membrane (pre-M), and non-structural protein 1 (NS1) are key targets for antibody responses. NS1, in particular, has been implicated in endothelial dysfunction, vascular leakage, and shock (Beatty et al., 2015). Host immune responses also contribute to pathogenesis. Cross-reactive memory T cells and autoimmune mechanisms can exacerbate inflammation, leading to plasma leakage, coagulopathy, and thrombocytopenia (Saputra, 2023). Recent studies have shown that NS1 can directly trigger endothelial permeability and vascular leak, independent of cytokine activity, highlighting its role as a major driver of severe dengue (Beatty et al., 2015). Epidemiological studies in Indonesia demonstrate that dengue incidence correlates strongly with population density and climate parameters, particularly rainfall and temperature, which influence mosquito breeding and transmission dynamics (Mamenun et al., 2024).

Taken together, these findings emphasize that dengue is a complex disease influenced by viral, host, and environmental factors. Understanding its pathophysiology and epidemiology is crucial for developing effective prevention and management strategies. Therefore, the purpose of this study is to analyze the clinical presentation and holistic management of dengue hemorrhagic fever in a pediatric patient, while highlighting the importance of integrative approaches that combine pharmacological therapy, supportive care, and preventive measures. It is expected that the findings of this study will contribute to strengthening multidisciplinary strategies, improving patient outcomes, and reducing the long-term burden of dengue in endemic regions (Meloni et al., 2024).

## 2. Materials and Methods

This study employed a descriptive case-based approach focusing on a pediatric patient clinically diagnosed with Dengue Hemorrhagic Fever (DHF). The case was observed and documented at the Bandar Lampung Satellite Inpatient Community Health Center, an urban referral facility located in Lampung Province, Indonesia, which is recognized as a dengue-endemic area. The study period covered the patient's hospitalization from admission until stabilization of clinical condition.

### 2.1. Data Collection

Data collection was conducted through direct anamnesis with the patient and her family, systematic physical examination, and supporting laboratory investigations. Anamnesis included detailed exploration of the primary complaint, onset and duration of fever, associated symptoms (nausea, vomiting, epistaxis, cough), past medical history (including malaria and previous dengue infection), allergies, lifestyle factors, and family concerns regarding disease progression.

### 2.2. Physical Examination

- Physical examination was performed comprehensively, covering:
- General condition: level of consciousness, nutritional status, and overall appearance.
- Vital signs: blood pressure, pulse, respiratory rate, and body temperature.
- Anthropometry: height, weight, and Body Mass Index (BMI).
- Organ-specific assessments: head and neck, thorax (inspection, palpation, percussion, auscultation), abdomen (inspection, palpation, percussion, auscultation), and extremities (capillary refill time, edema, muscle strength). Functional status was evaluated based on the patient's ability to perform daily activities, mobility, and sleep quality.

### 2.3. Laboratory Investigations

Laboratory investigations included a complete blood count, focusing on platelet levels and hematocrit values to assess disease severity and risk of complications. These parameters were interpreted according to WHO guidelines for dengue case classification (WHO, 2025). Additional laboratory markers such as leukocyte count and liver function tests were considered to exclude differential diagnoses.

### 2.4. Interventions

Interventions were administered according to national and international standards for dengue management. These included:

- Fluid therapy: oral hydration and intravenous Ringer Lactate infusion, adjusted to prevent plasma leakage and shock.
- Pharmacological treatment: paracetamol (safe antipyretic), ambroxol (mucolytic), vitamin C (antioxidant and platelet support), antacids and ranitidine (gastroprotective agents), and domperidone (antiemetic).
- Preventive measures: mosquito nets, protective clothing, fogging, and environmental sanitation.

Fluid therapy was prioritized to maintain hemodynamic stability, consistent with evidence-based recommendations for pediatric DHF patients (Yulistiani et al., 2025; Borré-Naranjo et al., 2022).

### 2.5. Patient and Family Education

Patient education was provided to the family regarding recognition of warning signs of DHF (persistent vomiting, severe abdominal pain, lethargy, bleeding manifestations) and preventive strategies using the 4M Plus method (draining, covering, recycling, and larvicide application).

Counseling emphasized the importance of maintaining hydration, monitoring danger signs, and implementing vector control at the household level.

### 2.6. Ethical Considerations

This case study was conducted in accordance with ethical principles for clinical research. Informed consent was obtained from the patient's guardian for the use of clinical data in academic reporting. Confidentiality was maintained by anonymizing patient identity and ensuring that all information was used solely for educational and scientific purposes.

### 3. Results and Discussion

The patient presented with biphasic fever lasting four days, accompanied by nausea, vomiting, cough, and bilateral epistaxis occurring twice on the fourth day. Medical history revealed previous episodes of malaria and dengue fever, with no history of allergies, smoking, alcohol consumption, or prior therapy. On physical examination, the patient appeared moderately ill, pale, and weak, with apathetic consciousness (GCS 13). Vital signs included blood pressure 110/70 mmHg, pulse 80/min, respiratory rate 20/min, and body temperature 36.6°C. Anthropometric measurements showed a height of 150 cm, weight of 45 kg, and BMI of 20, categorized as normal. Notable findings included dry and cracked oral mucosa, pale lips, hepatomegaly, and overall weakness, while cardiopulmonary examination revealed normal vesicular breath sounds and no additional cardiac murmurs.

Laboratory results indicated thrombocytopenia with platelet count of 121,000/ $\mu$ L (normal 150,000–450,000/ $\mu$ L) and elevated hematocrit of 48% (normal for females 36–46%), consistent with plasma leakage risk. These hematological parameters are widely recognized as early markers of severe dengue progression (Indraja et al., 2025; Kumar et al., 2025). Functional assessment revealed limitations in daily activities due to nausea and weakness, disturbed sleep from recurrent vomiting and anxiety about epistaxis, and dependence on hospitalization for intravenous hydration and monitoring.

Following intervention, the patient received fluid therapy (1,500 ml oral fluids in six hours and IV Ringer Lactate 500 cc at 20 drops/min), antipyretics, antiemetics, and supportive pharmacological agents. Preventive measures against mosquito exposure were implemented, and family education was provided regarding early recognition of danger signs and vector control strategies. Clinical monitoring showed stabilization of vital signs, reduction in fever episodes, and improvement in general condition. These outcomes align with holistic management approaches that emphasize integrative care combining pharmacological therapy, supportive treatment, and preventive strategies (Salehi et al., 2025; Shafie et al., 2024).

Dengue Hemorrhagic Fever is an acute viral infection caused by dengue virus serotypes 1–4, transmitted by *Aedes aegypti* and *Aedes albopictus*. The incubation period ranges from 4–10 days, with high viremia during the febrile phase (WHO, 2022). In endemic regions such as Lampung, seasonal rainfall exacerbates mosquito breeding, increasing transmission risk (Awalussiyam & Hendrati, 2024). Globally, dengue affects approximately 390 million individuals annually, with Indonesia reporting 143,266 cases in 2022. Lampung Province ranks among the highest incidence regions nationally, reflecting the endemic nature of the disease (Ministry of Health of the Republic of Indonesia, 2024). Pediatric patients are particularly vulnerable due to their susceptibility to plasma leakage and severe complications (Parveen et al., 2023).

In this case, the patient's history of previous dengue infection suggests secondary infection, which increases the risk of Antibody-Dependent Enhancement (ADE). ADE occurs when non-neutralizing antibodies facilitate viral entry into monocytes, leading to massive replication and cytokine storm (Teo et al., 2023). This mechanism explains the severity of symptoms observed. Clinical manifestations in this patient, including biphasic fever, epistaxis, hepatomegaly, and persistent vomiting, are consistent with the critical phase of DHF. The biphasic fever pattern reflects viral replication dynamics, while epistaxis indicates mucosal bleeding. Hepatomegaly and intercostal retraction suggest systemic involvement of hepatic and respiratory systems (Beatty et al., 2015).

Laboratory findings of thrombocytopenia and elevated hematocrit are hallmark indicators of DHF progression. Platelet destruction and bone marrow suppression contribute to bleeding risk, while hemoconcentration reflects plasma leakage. These parameters are widely recognized as predictors of severe dengue (Indraja et al., 2025; Kumar et al., 2025). Differential diagnoses such as malaria, typhoid fever, and other viral infections were considered. However, the biphasic fever pattern, mucosal bleeding, and laboratory findings strongly supported DHF diagnosis. NS1 antigen or IgM serology could further confirm the diagnosis, though clinical and epidemiological context was sufficient in this case (WHO, 2012). Complications of DHF include Dengue Shock Syndrome (DSS), massive bleeding, and multi-organ failure. Early recognition and supportive therapy significantly improve prognosis, with recovery rates exceeding 95% when hydration and monitoring are promptly initiated (Salehi et al., 2025). The therapeutic approach in this patient emphasized safe antipyretics (paracetamol) to control fever, avoiding NSAIDs due to bleeding risk. Ambroxol was used to relieve cough, vitamin C to support platelet function and immunity, ranitidine to protect mucosa, and domperidone to control vomiting. Fluid therapy was prioritized to prevent hypovolemia and shock (Borré-Naranjo et al., 2022).

Preventive strategies were also implemented, including mosquito nets, protective clothing, fogging, and environmental sanitation. Family education emphasized recognition of warning signs such as severe abdominal pain, persistent vomiting, lethargy, and bleeding, which are critical for early intervention (Shafie et al., 2024). The novelty of this study lies in its holistic management approach, integrating clinical therapy, supportive care, preventive strategies, and family education. Unlike conventional reports that focus solely on pharmacological treatment, this case highlights the importance of combining medical, environmental, and psychosocial interventions to reduce disease burden. This case demonstrates that early recognition, integrative management, and preventive education are essential in controlling DHF progression and preventing complications. The holistic approach adopted here provides a model for pediatric dengue management in endemic regions, offering insights into multidisciplinary strategies that can improve patient outcomes and reduce long-term public health impact.

#### 4. Conclusions

The clinical presentation of a 12-year-old female patient diagnosed with Dengue Hemorrhagic Fever (DHF) grade II highlights the complexity of dengue pathophysiology and the necessity of integrative management strategies in endemic regions. The patient exhibited biphasic fever, persistent vomiting, bilateral epistaxis, hepatomegaly, and laboratory abnormalities including thrombocytopenia and elevated hematocrit, all of which are hallmark indicators of plasma leakage and impending critical phase complications. These findings reinforce the importance of early recognition and comprehensive assessment that goes beyond isolated symptom management, incorporating both clinical and epidemiological contexts. The therapeutic approach in this case emphasized safe pharmacological interventions such as paracetamol for fever, ambroxol for respiratory support, vitamin C for immune modulation, ranitidine for mucosal protection, and domperidone for antiemetic control—combined with fluid therapy to prevent hypovolemia and shock. Preventive measures, including mosquito control, environmental sanitation, and family education on warning signs, were integrated to address external risk factors and reduce transmission potential. The novelty of this study lies in its holistic framework, which not only treated the acute manifestations of DHF but also incorporated functional, psychosocial, and preventive dimensions, thereby offering a more sustainable model of care. Unlike conventional case management that focuses narrowly on pharmacological therapy, this approach demonstrates that multidisciplinary strategies linking clinical medicine, public health, and family empowerment can significantly improve patient outcomes and mitigate long-term disease burden. Ultimately, this case underscores that DHF management in pediatric populations requires a balance of evidence-based medical interventions and community-centered preventive practices, with the expectation that such integrative models will strengthen resilience against recurrent outbreaks, reduce morbidity and mortality, and provide a replicable framework for dengue control in other endemic settings.

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**Ethical Clearance:** Not applicable. Ethical clearance was not required for this case report as it involved routine clinical management without experimental intervention.

**Informed Consent Statement:** Written informed consent has been obtained from the patient's guardian to publish this case report, including clinical details and images.

**Data Availability Statement:** All data supporting the findings of this study are contained within the article. No additional datasets were generated or analyzed.

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**Conflicts of Interest:** All the authors declare that there are no conflicts of interest.

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