

An Updated Narrative Review on Dengue

ALAMA

Abstract

Dengue fever (DF) is a mosquito-borne viral illness that has spread rapidly throughout the world in recent years. Dengue virus is primarily transmitted by female mosquitoes (Aedes aegypti) species and also by (Aedes Albopictus). Symptoms are usually flu-like but can progress to severe dengue haemorrhagic fever, a life-threatening condition. The incidence of DF has increased dramatically over the past few decades. The true number of dengue cases is underestimated because the vast majority of infected patients are asymptomatic or with mild and self-limited disease. Many patients were misdiagnosed to be other febrile illnesses. It is estimated that 2.5 billion people are at risk of having the disease, making dengue fever a major international public health concern. This review provides insights on dengue fever transmission, complications, treatment and impact on the healthcare system.

Keywords: DENV-(Dengue virus), DF (Dengue fever), DHF-(Dengue hemorrhagic fever), DSS(Dengue shock syndrome)

Journal of Green Life Med. Col. 2025; 10(2): 58-61

Introduction:

Dengue fever has become an increasingly serious public health challenge in Bangladesh, with significant shifts in transmission patterns, clinical presentations, and the types of circulating virus strains.¹ Historically confined to urban areas like Dhaka, the disease has expanded rapidly into rural and peripheral regions.²

Dengue fever is acute arthropod-borne viral disease that is caused by four serotypes (DENV-1, 2, 3, 4). dengue viruses are transmitted by Aedes mosquitoes, mainly *Aedes aegypti* and less commonly by *A. albopictus*.³ Its symptoms range from asymptomatic and flu-like mild illness to a potentially fatal hemorrhagic fever, dengue shock syndrome. DF is a global health challenge, and it is the most common arboviral infection worldwide. WHO estimates that the annual incidence of DF is 100 to 400 million infections, with about half of the world's population is at risk of having the disease.⁴ Recent studies showed a significant increase in the number of DF cases in the last two decades, and many regions have suffered seasonal outbreaks. In Bangladesh, dengue cases and deaths increased by approximately five and six-fold respectively in 2023 compared to 2022.⁴ This significant increase in incidences has placed a significant burden on the health systems of many countries, particularly those dealing with

other health issues, such as the COVID-19 pandemic.⁵ A recent study mentioned that the annual economic burden of dengue fever was almost US\$ 1,384 million in Southeast Asia with a per capita cost up to \$ 2.41.⁶

Transmission:

The principal vector of dengue virus is *Aedes Aegypti*, that is widely distributed throughout the world. Other *Aedes* species such as *A. albopictus* and *A. luciocephalus* can act as potential vectors.⁷ The transmission of dengue virus and other mosquito borne diseases is sensitive to rainfall, temperature and humidity that favour the vector to develop the virus.⁸ Mosquito bite can transmit all dengue serotypes but susceptibility of the vector to dengue virus varies geographically.⁹ A non-vector transmission can occur as in blood transfusion and needlestick injuries.¹⁰

Life Cycle:

Primarily, the DENV was transmitted via sylvatic cycles in Asia and Africa by *Aedes* mosquito and the inhuman primates, with occasional appearances of mortal populations.¹¹ Still, currently, the global spread of DENV follows its emergence of all types of transmissions (e.g., sylvatic cycles and perpendicular mosquito to mosquito). Therefore, its primary life cycle entirely involves the transmission between *Aedes* mosquitoes and humans.¹² One report suggests that ticks or other creatures may act as incidental hosts and may serve as bridges of DENV infection.¹³

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Received: 27.05.2025

Accepted: 15.06.2025

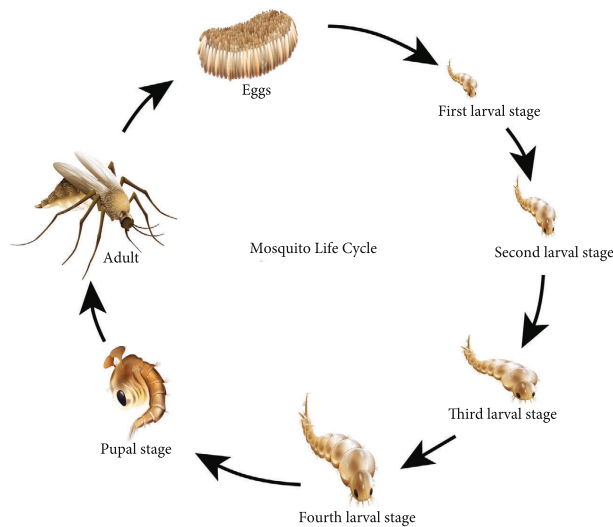
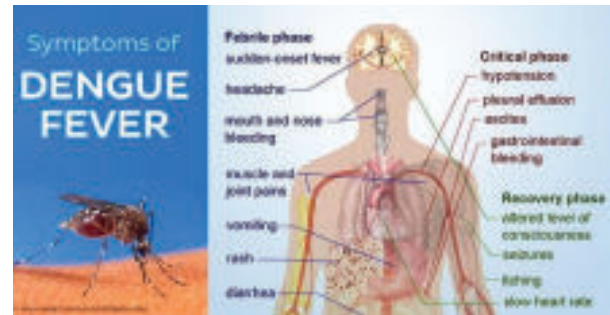
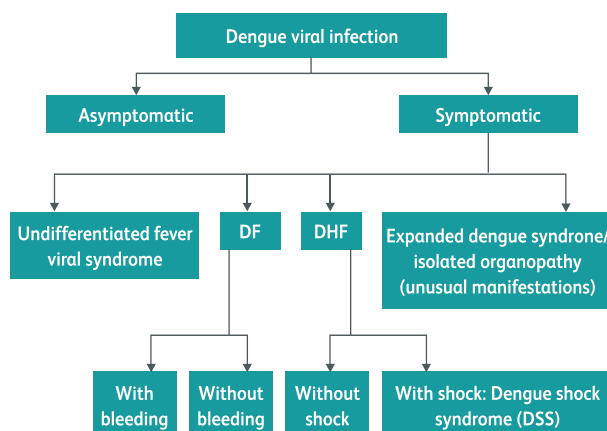


Figure: Life cycles of mosquitoes

Clinical manifestation: Dengue fever is characteristic or a symptomatic. Clinical complaint onsets 4- 6 days after pestilent mosquito bite.

Symptomatic vs Asymptomatic: (Characteristics)

Asymptomatic Infections itinerant cases with characteristic DENV infections have viremia situations that are plainly likely to render them contagious to mosquitoes.¹⁴ Individualities who are asymptomatic with a DENV infection also have sensible situations of contagion circulating in the blood,^{15,16} but the question remains open as to whether or not inapparent DENV infections have high enough viremias to be contagious. Because inapparent DENV infections are common,^{17,18} it follows that they could play a part in the conservation of DENV in its natural transmission cycle, should their viremias be above the contagious threshold position.



Diagnosis:

The symptoms and signs of dengue fever alone make it very difficult to differentiate it from other febrile diseases, and detection is also difficult since early symptoms are ambiguous, viremia may go undetected, and serological testing reveals dengue late in the disease's progression.^{8,9} When plasma leakage and thrombocytopenia are found, this is a highly definitive diagnosis.¹⁰ Disease can be ruled out if sign and symptoms appear 2 weeks after leaving an endemic area or if the fever continues for 2 weeks or more.

Enzyme-linked immunosorbent assay:

The benefits of this test include its high sensitivity and simplicity of use in identifying acute-phase (IgM) and recovery-phase (IgG) antibodies and antigens (Ag), and it is commonly used to diagnose. Production of IgM It differs. It may be detected from the 3 to 5 days after symptoms appear, but it could also be undetectable until the eighth day of disease progression.¹⁹ MAC-ELISA used for the qualitative detection of the virus antigen in the blood.²⁰ Its benefit is that it's used during epidemics since it has a quick detection of transmission progression, whereas in endemic areas a high number of clinical samples are examined.²¹ IgG-ELISA is used to differentiate between primary and secondary dengue virus infections.²² It is highly sensitive since it is performed in sero-epidemiological research.²³

Reverse transcription-polymerase chain reaction (RT-PCR):

It is rapid, sensitive, and easy to use. Used to identify the genome in human tissue or mosquito also useful in quickly identifying novel serotypes in endemic areas.^{24, 25} Several studies have found that RT-PCR is affected by the area of the genome chosen to be increased as well as the primers used to accomplish this purpose.²⁴ Capability of detecting the dengue serotype causing the continuing sickness and quick genomic categorization of dengue virus serotypes.²⁶

Treatment:

Up till this moment, there is no prescribed curing therapy for DF that the patient can take to recover from the disease.

In severe cases, the patients may need to be hospitalized for supportive care, and for electrolyte replacement, the patient may need intravenous fluid, moreover, the blood pressure measurement is vital if the patient bleeds a blood transfusion is a must to avoid rapid blood pressure falls as well as the hypovolemic shock.²⁷

The availability of four antigenically different dengue serotypes, each capable of evoking cross-reactive and disease-enhancing antibody responses against the remaining three serotypes, has made dengue vaccine development a problematic undertaking.¹⁶ Prevention has always been better than cure, especially in developing and low-income countries with insufficient resources and shaky healthcare infrastructures.²⁸

Symptomatic treatment:

Throughout the febrile period, lavish oral fluid administration is advised, as is antipyretic prophylaxis with paracetamol as needed.¹⁷ The patient should avoid any other nonsteroidal anti-inflammatory drugs to avoid the risk of dengue fever bleeding complications.¹⁷ It is very advised to monitor the patient's daily whole blood count if there is a health care hospital or clinic nearby. Severe exhaustion, early bleeding signs, and dehydration indications such as severe diarrhea and vomiting are all indicators that the patient should be admitted to the hospital for close monitoring and follow-up.¹⁷

Prevention:

In preventing dengue fever several issues, such as poor understanding of the pathogenic mechanisms of dengue fever, incapability to manage the vector population, absence of therapeutic intervention against the disease, and biological challenges in developing a vaccine, impede efforts to reduce the burden of dengue.¹⁷ If an individual becomes a well-known case of dengue fever or knows someone who has been diagnosed with the disease, the patient should avoid mosquito bites during the first week because the virus will be spread in the patient's blood and will subsequently transmit the disease to other uninfected mosquitoes, increasing the percentage of infected individuals and potentially increasing hospitalization and the burden in the health care services.⁴ To achieve effective dengue fever prevention, all community members must work together to combat mosquito vectors.⁴ This can be achieved through the following actions: Furthermore, there is continuing research among many worldwide collaborators in pursuit of breakthrough tools and innovative techniques that will help global efforts to stop dengue transmission. WHO encourages the combination of vector management practices in order to establish long-term, successful locally tailored vector control programs.⁴

Discussion:

In Bangladesh, suggesting that the disease is evolving in terms of both its demographic impact and clinical presentation. These changes, particularly the shift toward older age groups and the increasing predominance of females, raise new concerns for public health management and warrant closer examination of the factors contributing to these trends.²⁶

The probable source of the dengue outbreak has been determined to be stagnant water that serves as a breeding habitat for vectors. It is strongly advised to set up surveillance, an early reporting system, and implement protective measures against the vector.²⁹

Fever, haemorrhagic fever, and dengue shock syndrome are all possible symptoms of dengue infection (DSS). The term "expanded dengue syndrome" (EDS), which has been reported more frequently, was created by the World Health Organization (WHO) to describe cases that do not fit into either DHF or DSS and have unusual manifestations in other organs such as the cardiovascular system, nervous system, kidneys, gut, and hematological system. Additionally, EDS is spreading throughout the world with unusual characteristics and a greater severity. There are more and more reports of uncommon, little-reported presentations with serious organ involvement. This study provides information about clinical presentation which aids in diagnosing dengue quickly and preventing additional outbreaks, especially during active epidemics.³⁰

Conclusion:

The social and economic burden of mosquito-borne dengue infection is extensively alarming. The morbidity and mortality of dengue and other mosquito-borne viral infection can be reduced by performing early identification of high-risk patients and appropriate management for severe cases. New strategy for early dengue infection and severity risk prediction early in the course of illness is indispensable, so that management strategies can be promptly implemented.

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