

Arif Rohman Mansur
Yelly Herien



Understanding **DENGUE**

Exploring Epidemiology, Pathogenesis,
and Management



Editor: Ibnu Tolhah



Understanding DENGUE

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and Management

The book "Understanding Dengue: Epidemiology, Pathogenesis, and Management" is a comprehensive guide for health professionals, researchers, and students interested in dengue. The book is divided into seven chapters, each discussing various aspects of dengue in detail. Chapter 1 provides an introduction to the book and its scope. Chapter 2 focuses on the epidemiology and pathogenesis of dengue, providing insights into the global burden of the disease, its definition, and the mosquito cycle. Chapter 3 discusses dengue's transmission and vector ecology, including the history of dengue fever, the transmission cycle, and the vector ecology. Chapter 4 covers the diagnosis of dengue, including clinical and laboratory diagnostics, virological and serological methods, and rapid tests. Chapter 5 provides detailed information on dengue's signs and symptoms, including the disease's characteristics, the febrile phase, the critical phase, and the recovery phase. It also discusses dengue hemorrhagic fever and dengue shock syndrome. Chapter 6 focuses on managing dengue, including infection prevention and control, prevention of dengue fever outbreaks with Wolbachia bacteria, prevention of dengue fever in travelers, and vaccination. Chapter 7 covers health care and assessment, including nursing assessment, nursing diagnosis, nursing interventions, and home care guidelines. The book is informative, well-structured, and easy to understand, making it an essential guide for anyone interested in understanding dengue's epidemiology, pathogenesis, and management.



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UNDERSTANDING DENGUE: EXPLORING EPIDEMIOLOGY, PATHOGENESIS, AND MANAGEMENT

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**UNDERSTANDING DENGUE: EXPLORING EPIDEMIOLOGY,
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PREFACE

Alhamdulillahil-ladzii bini'matihi tatimmush-salihaat. Praise be to Allah, who, with all His blessings all good deeds can be realized perfectly. The book entitled "Understanding Dengue: Exploring Epidemiology, Pathogenesis, and Management"

Dengue is a severe public health issue in many parts of the world, affecting millions yearly. Understanding Dengue: Exploring Epidemiology, Pathogenesis, and Management is a comprehensive book that provides detailed insight into various aspects of dengue, including its epidemiology, pathogenesis, diagnosis, and management.

This book is intended for health professionals, researchers, and students interested in the subject matter. The book is divided into seven chapters, each discussing various aspects of dengue in detail. The first chapter introduces the reader to dengue's background, the book's purpose and scope, and the methodology used to compile the information.

Chapter two delves into the epidemiology and pathogenesis of dengue, providing insights into the global burden of the disease, its definition, and the mosquito cycle. Chapter three focuses on dengue's transmission and vector ecology, including the history of dengue fever, the transmission cycle, and the vector ecology.

Chapter four discusses the diagnosis of dengue, including clinical and laboratory diagnostics, virological and serological methods, and rapid tests. Chapter Five covers the signs and symptoms of dengue, including the characteristics of the disease, the febrile phase, the critical phase, and the recovery phase. It also discusses dengue hemorrhagic fever and dengue shock syndrome.

Chapter six provides detailed information on managing dengue, including infection prevention and control, prevention of dengue fever outbreaks with Wolbachia bacteria, prevention of dengue fever in travelers, and vaccination.

Chapter Seven focuses on health care and assessment, including nursing assessment, nursing diagnosis, nursing interventions, and home care guidelines.

This book is valuable for anyone interested in understanding dengue's epidemiology, pathogenesis, and management. The book is informative, well-structured and easy to understand, making it an essential guide for health professionals, researchers, and students alike.

Padang, April 24, 2023

Arif Rohman Mansur

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CHAPTER

1

INTRODUCTION

A. Background

Dengue is an arboviral infection transmitted by the *Aedes aegypti* mosquito and is a global health problem in tropical and subtropical regions, with an increasing incidence and nearly half of the world's population is at risk of contracting dengue.(Kularatne and Dalugama, 2022). Dengue is a virus that is spread through the bite of the *Aedes* mosquito and is one of the most widely transmitted insect-borne viral diseases worldwide. Dengue symptoms include muscle spasms, joint pain, dandy fever, or seven-day fever, which can last as long as seven days. Although most cases are asymptomatic, the disease can be fatal if not treated properly. The virus is widespread in tropical and subtropical regions worldwide, and dengue hemorrhagic fever infection is now endemic in several regions of the world. Some people who have been infected with one type of dengue virus may experience more severe symptoms and even bleeding if infected with another type of dengue virus. Therefore, dengue is also known as dengue hemorrhagic fever(Schaefer et al., 2023).

Dengue Hemorrhagic Fever(DHF) is an acute viral infectious disease caused by the dengue virus which is characterized by symptoms of fever 2-7 days accompanied by the appearance of bleeding, decreased platelet count (thrombocytopenia), presence of hemoconcentration which is characterized by plasma leakage (increased hematocrit, ascites, pleural effusion, hypoalbuminemia). May be accompanied by atypical symptoms such as headache, muscle & bone pain, skin

CHAPTER

2

EPIDEMIOLOGY AND PATHOGENESIS

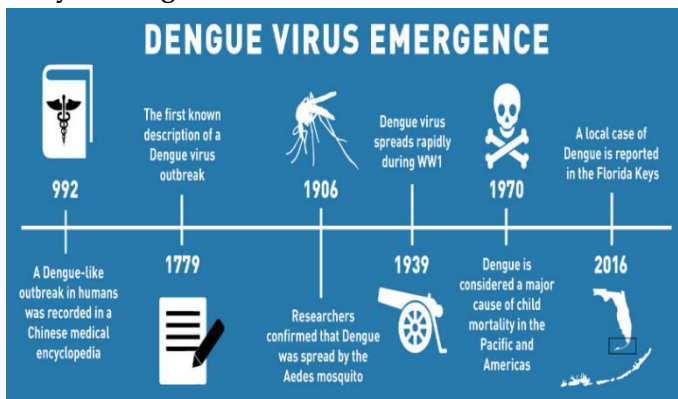
A. The Global Burden of Dengue

In 1953, dengue hemorrhagic fever (DHF) was first reported in the Philippines and spread to countries in Southeast Asia and the West Pacific region. One of the main pathophysiological features of DHF is plasma leakage which differentiates it from DF. Severe plasma leakage can lead to hypovolemic shock. Several factors are thought to influence disease severity, including viral virulence, preexisting dengue antibodies, immune dysregulation, lipid changes, and host genetic susceptibility. However, the exact mechanism that triggers DHF remains unclear. Currently, there are no specific drugs or licensed vaccines available to treat DHF in its clinical presentation (Wang et al., 2020). Dengue is a type of viral disease that spreads through vectors, caused by the dengue flavivirus (DENV). Every year, it is estimated that there are around 400 million cases and 22,000 deaths from dengue hemorrhagic fever (DHF) worldwide. This disease has been reported in more than 100 countries in the tropics and subtropics (Roy and Bhattacharjee, 2021). Dengue viruses (DENVs) are the most common arthropod-borne viruses that cause viral disease in humans, with 50-100 million infections occurring each year. (Bäck and Lundkvist, 2013).

CHAPTER 3

TRANSMISSION AND VECTOR ECOLOGY

A. History of Dengue Fever



Picture10. Dengue virus emergence

Source:

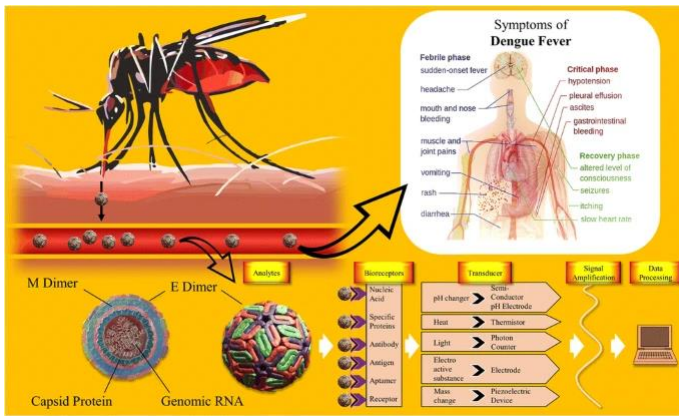
<https://www.centralmosquitocontrol.com/resources/disease-information/dengue>

Dengue fever (DF) has been known for a long time; in 992, the first record of a disease with similar symptoms was recorded in a Chinese medical encyclopedia. In the 18th and 19th centuries, with the development of the global shipping industry, port cities developed and became increasingly urbanized, providing ideal conditions for the main vector of the *Aedes aegypti* mosquito. Both mosquitoes and viruses spread to new geographic areas, triggering major epidemics. However, because it was spread by sailing ships, there was a long interval between outbreaks (about 10-40 years). After World War II, rapid urbanization in Southeast Asia led to increased transmission and

CHAPTER

4

DIAGNOSIS



Picture 18. Advance detection and trend of dengue virus

Source: <https://link.springer.com/article/10.1007/s00604-019-3420-y>

Control and early detection of dengue virus infection is currently a global concern in the field of public health. Several main approaches that have been developed to detect various biomarkers and dengue virus serotypes are optical, electrochemical, microfluidic, enzyme linked immunosorbent assay (ELISA), and smartphone-based biosensors. Miniaturization of these methods in the future development of commercial biosensors can open up new opportunities in the early diagnosis of dengue virus infection (Eivazzadeh-Keihan et al., 2019).

CHAPTER

5

SIGNS AND SYMPTOMS

A. Characteristics of the disease (signs and symptoms)

The clinical signs of dengue fever can vary from a mild fever to more serious conditions such as dengue hemorrhagic fever (DHF) or dengue shock syndrome (DSS). These symptoms include thrombocytopenia, leukopenia, and increased vascular permeability (Roy and Bhattacharjee, 2021). DENV infection may be asymptomatic or self-limited, causing an acute febrile illness of varying severity. The classic form of dengue fever (DF) has symptoms such as high fever, headache, abdominal pain, rash, myalgia and arthralgia. Severe dengue, such as dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS), is accompanied by a decrease in the number of platelets, leakage of blood vessels, and a decrease in blood pressure. DSS, which can be fatal, has signs such as systemic shock (Bäck and Lundkvist, 2013). DHF is characterized by fever, hemorrhagic diathesis, and a tendency to develop a potentially fatal shock syndrome. Hematologic findings include vasculopathy, coagulopathy, and thrombocytopenia as the most constant findings (Pancharoen et al., 2002).

Dengue fever is a severe flu-like illness that affects infants, young children and adults, but rarely causes death. Symptoms usually last for 2-7 days, after an incubation period of 4-10 days following the bite of an infected mosquito. The World Health Organization classifies dengue into 2 main categories: dengue (with/without warning signs) and severe dengue. The sub-classification of dengue with or without warning signs is designed to help healthcare practitioners triage patients for



Picture 27. Dengue treatment market

Source: <https://growthmarketreports.com/report/dengue-treatment-market-global-industry-analysis>

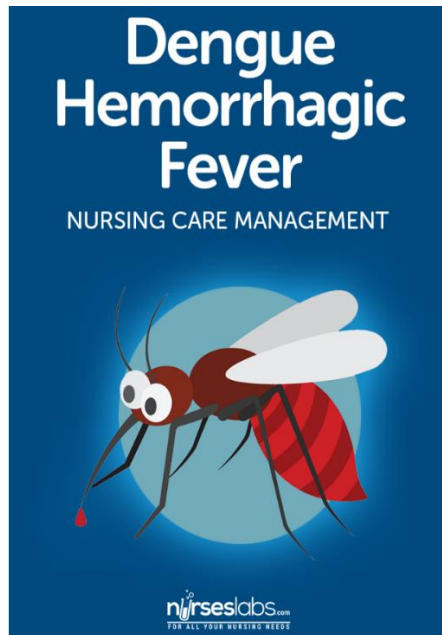
A. Introduction

Treatment There is no specific treatment for dengue fever. Fever reducers and pain relievers can be used to control symptoms of aches and pains in the muscles, as well as fever. The best options for dealing with these symptoms are acetaminophen or paracetamol. NSAIDs (non-steroidal anti-inflammatory drugs), such as ibuprofen and aspirin should be avoided. These anti-inflammatory drugs work by thinning the blood, and in diseases with a risk of bleeding, blood thinners can worsen the prognosis of the disease.

CHAPTER

7

HEALTH CARE AND ASSESSMENT



Picture 36. DHF Nursing care management

Source: <https://www.pinterest.com/pin/169870217174918453/>

A. Nursing Assessment

Nursing assessment of patients with dengue hemorrhagic fever can be carried out using the health functional pattern approach according to Gordon. The following is a nursing assessment based on 11 health functional patterns in dengue hemorrhagic fever patients:

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