

## Dengue Fever - Facts and Findings

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### ABSTRACT

**Objectives:** To describe the epidemiology and current situation of Dengue Fever in Pakistan and to formulate preventive and precautionary measures.

**Globalization:** Dengue has emerged as a worldwide problem only since the 1950s. Today the Epidemic of Dengue Viral Infections has spread severely throughout the country. The WHO estimates that 50 to 100 million infections occur yearly, including 500,000 DHF cases and 22,000 deaths, mostly among children.

**Causative agent:** Dengue fever (DF) is caused by any of four closely related viruses, or serotypes: dengue 1-4. Infection with one serotype does not protect against the others, and sequential infections put people at greater risk for dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).

**Transmission:** Dengue is transmitted between people by the mosquitoes *Aedes aegypti* and *Aedes albopictus*, which are found throughout the world. *Aedes aegypti*, the principal mosquito vector of dengue viruses is an insect closely associated with humans and their dwellings. People not only provide the mosquitoes with blood meals but also water-holding containers in and around the home needed to complete their development.

**Expectations:** The condition generally lasts a week or more. Although uncomfortable, dengue fever is not deadly. People with the condition should fully recover.

**Prevention:** As mosquito sprays are not sufficient, we need a multiple approach for mosquito eradication. The best way to prevent dengue virus infection is to take special precautions to avoid being bitten by mosquitoes.

**Precautions:** Precautions to prevent dengue fever are far better than getting infected. Avoiding mosquitoes bite is the major precaution against dengue fever. People should take necessary precautions to combat dengue fever before it gets in body:

**Key words:** *Aedes Aegypti*, Dengue Fever, Epidemic, Prevention, Precautions.

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### INTRODUCTION

Dengue fever: Also known as O'nyong-nyong fever; Dengue-like disease; Breakbone fever<sup>1</sup>.

**Dengue fever** is an infectious tropical disease caused by the dengue virus. Symptoms include fever, headache, muscle and joint pains, and a characteristic skin rash that is similar to measles. In a small proportion of cases the disease develops into the life-threatening **dengue hemorrhagic fever**, resulting in bleeding, low levels of blood platelets and blood plasma leakage, or into **dengue shock syndrome**, where dangerously low blood pressure occurs<sup>2</sup>.

With more than one-third of the world's population living in areas at risk for transmission, dengue infection is a leading cause of illness and death in the tropics and subtropics. As many as 100 million people are infected yearly. Dengue is caused

by any one of four related viruses transmitted by mosquitoes. There are not yet any vaccines to prevent infection with dengue virus (DENV) and the most effective protective measures are those that avoid mosquito bites. When infected, early recognition and prompt supportive treatment can substantially lower the risk of developing severe disease.

Dengue has emerged as a worldwide problem only since the 1950s. Although dengue rarely occurs in the continental United States, it is endemic in Puerto Rico, and in many popular tourist destinations in Latin America and Southeast Asia; periodic outbreaks occur in Samoa and Guam.<sup>3</sup>

Expansion of Epidemic Dengue Viral Infections in Pakistan. In Pakistan, an outbreak of DHF was first reported in Karachi in 1994. From September through December 2005, at least 3 major hospitals in Karachi had a sudden increase in the number of patients with signs consistent with that of Dengue Viral Infections. Today the Epidemic of Dengue Viral Infections has spread severely throughout the country. According to Dr. Javed Akram, the Head of Jinnah Hospital Lahore

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and chairman of dengue expert committee: Until date, officially more than 3,500 people have been infected and over a dozen have died from the recent dengue virus in Pakistan outbreaks.

"These are the official figures but I think the number of unreported dengue patients is more than 500,000."<sup>4</sup>

Dengue Fever has gripped Pakistan once again and the areas of Punjab are being affected to the point of a near panic.<sup>5</sup>

International travelers' risk of dengue infection can vary dependant on transmission in the area as well as exposure to mosquitoes. You are at greater risk when an outbreak or epidemic is occurring. If your hotel or resort does not have air conditioning or windows and doors with secure, intact screens you may be at higher risk. You should take precautions like using repellent and killing any visible mosquitoes. CDC recommends repellents containing DEET, picaridin, oil of lemon eucalyptus or IR3535 as the active ingredient. Repellent can be applied to exposed skin and/or clothing. Clothing impregnated with permethrin is another option (pre-treated or you can treat yourself). Some spatial repellent/insecticide products (mosquito coils, plug-in or butane powered devices), may assist in reducing the risk of mosquito around you.<sup>6</sup>

#### **Global Dengue.**

Today about 2.5 billion people, or 40% of the world's population, live in areas where there is a risk of dengue transmission. Dengue is endemic in at least 100 countries in Asia, the Pacific, the Americas, Africa, and the Caribbean. The World Health Organization (WHO) estimates that 50 to 100 million infections occur yearly, including 500,000 DHF cases and 22,000 deaths, mostly among children.<sup>7</sup>

#### **Epidemiology.**

Dengue fever (DF) is caused by any of four closely related viruses, or serotypes: dengue 1-4. Infection with one serotype does not protect against the others, and sequential infections put people at greater risk for dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).<sup>4</sup> In many parts of the tropics and subtropics, dengue is endemic, that is, it occurs every year, usually during a season when *Aedes* mosquito populations are high, often when rainfall is optimal for breeding. These areas are, however, additionally at periodic risk for epidemic dengue, when large numbers of people become infected during a short period. Dengue epidemics require a coincidence of large numbers of vector mosquitoes, large numbers of people with no immunity to one of the four virus types (DENV 1, DENV 2, DENV 3, DENV 4), and the opportunity for contact between the two. Although *Aedes* are common in the southern U. S., dengue is endemic in

northern Mexico, and the U.S. population has no immunity, the lack of dengue transmission in the continental U.S. is primarily because contact between people and the vectors is too infrequent to sustain transmission.<sup>8</sup>

#### **Transmission of the Dengue Virus**

Dengue is transmitted between people by the mosquitoes *Aedes aegypti* and *Aedes albopictus*, which are found throughout the world. Insects that transmit disease are vectors. Symptoms of infection usually begin 4 - 7 days after the mosquito bite and typically last 3 - 10 days. In order for transmission to occur the mosquito must feed on a person during a 5-day period when large amounts of virus are in the blood; this period usually begins a little before the person become symptomatic. Some people never have significant symptoms but can still infect mosquitoes. After entering the mosquito in the blood meal, the virus will require an additional 8-12 days incubation before it can then be transmitted to another human. The mosquito remains infected for the remainder of its life, which might be days or a few weeks.

In rare cases dengue can be transmitted in organ transplants or blood transfusions from infected donors, and there is evidence of transmission from an infected pregnant mother to her fetus. But in the vast majority of infections, a mosquito bite is responsible.<sup>9</sup>

#### **Dengue is an Emerging Disease**

The four dengue viruses originated in monkeys and independently jumped to humans in Africa or Southeast Asia between 100 and 800 years ago. Dengue remained a relatively minor, geographically restricted disease until the middle of the 20th century. The disruption of the second world war – in particular the coincidental transport of *Aedes* mosquitoes around the world in cargo - are thought to have played a crucial role in the dissemination of the viruses. DHF was first documented only in the 1950s during epidemics in the Philippines and Thailand. It was not until 1981 that large numbers of DHF cases began to appear in the Caribbean and Latin America, where highly effective *Aedes* control programs had been in place until the early 1970s<sup>10</sup>

**Entomology & Ecology:** *Aedes Aegypti*, the principal mosquito vector of dengue viruses is an insect closely associated with humans and their dwellings. People not only provide the mosquitoes with blood meals but also water-holding containers in and around the home needed to complete their development. The mosquito lays her eggs on the sides of containers with water and eggs hatch into larvae after a rain or flooding. A larva changes into a pupa in about a week and into a mosquito in two days. See *Aedes* main aquatic habitats; from tree

cavities to toilets and learn about the mosquitoes life cycle. People also furnish shelter as *Ae. aegypti* preferentially rests in darker cool areas, such as closets leading to their ability to bite indoors<sup>9</sup>.

It is very difficult to control or eliminate *Ae. aegypti* mosquitoes because they have adaptations to the environment that make them highly resilient, or with the ability to rapidly bounce back to initial numbers after disturbances resulting from natural phenomena (e.g., droughts) or human interventions (e.g., control measures). One such adaptation is the ability of the eggs to withstand desiccation (drying) and to survive without water for several months on the inner walls of containers. For example, if we were to eliminate all larvae, pupae, and adult *Ae. aegypti* at once from a site, its population could recover two weeks later as a result of egg hatching following rainfall or the addition of water to containers harboring eggs<sup>11</sup>.

**Expectations (prognosis):** The condition generally lasts a week or more. Although uncomfortable, dengue fever is not deadly. People with the condition should fully recover.<sup>12</sup>

**Etymology:** The origins of the word "dengue" are not clear, but one theory is that it is derived from the Swahili phrase *Ka-dinga pepo*, which describes the disease as being caused by an evil spirit.<sup>[13]</sup> The Swahili word *dinga* may possibly have its origin in the Spanish word *dengue*, meaning fastidious or careful, which would describe the gait of a person suffering the bone pain of dengue fever.<sup>[14]</sup> However, it is possible that the use of the Spanish word derived from the similar-sounding Swahili.<sup>[13]</sup> Slaves in the West Indies having contracted dengue were said to have the posture and gait of a dandy, and the disease was known as "dandy fever".<sup>[15][16]</sup>

**Prevention:** As mosquito sprays are not sufficient, we need a multiple approach for mosquito eradication, such as biological control, Larvicide, mass awareness, quarantine for patients and travel advisory. Guppy fishes are the best agent for the biological control of dengue mosquito.<sup>17</sup>

The best way to prevent dengue virus infection is to take special precautions to avoid being bitten by mosquitoes. Several dengue vaccines are being developed, but none is likely to be licensed by the Food and Drug Administration in the next few years. When outdoors in an area where dengue fever has been found

- Use a mosquito repellent containing DEET, picaridin, or oil of lemon eucalyptus
- Dress in protective clothing—long-sleeved shirts, long pants, socks, and shoes
- Because *Aedes* mosquitoes usually bite during the day, be sure to take precautions, especially during early morning hours before daybreak and in the late afternoon before dark.

- Other precautions include:
- Keeping unscreened windows and doors closed
- Keeping window and door screens repaired
- Getting rid of areas where mosquitoes breed, such as standing water in flower pots, containers, birdbaths, discarded tires, etc.<sup>18</sup>
- At present, there is no specific treatment. No vaccine is current available. The only method of controlling or preventing Dengue Fever is to combat the vector mosquitoes.
- Vector control is implemented using environmental management and chemical methods. Proper solid waste disposal, elimination of stagnant water in domestic environment and improved water storage practices.
- Aerosol and liquid spray has to be applied directly to the adult mosquito for effective killing, e.g. household pesticides.
- Mosquito coil and electric mosquito mat/ liquid has to be placed near possible entrance, such as window, for mosquito.
- Wear long-sleeved clothes and long trousers when going outdoors. Bodies could be protected from mosquito bite by applying insect repellent (containing DEET) on the clothes and exposed part of the body especially when you travel to Dengue Fever endemic areas.
- Mosquito bed net could be used when the room is not air-conditioned<sup>19</sup>.

**Dengue Fever Precautions:** Precautions to prevent dengue fever are far better than getting infected. With some necessary dengue fever precautions one can get rid of it and can easily deal with dengue virus before its deadly affect. Avoiding mosquitoes bite is the major precaution against dengue fever. People should take following necessary precautions to combat dengue fever before it gets in body:

- Keep home, environment and surrounding hygiene
- Remove all stagnant water and containers
- Keep all drains well maintained and repair all chokes
- Avoid accumulation of ground water
- Fill up all defective grounds
- Don't store water
- Avoid unnecessary irrigation
- Cover all containers properly
- Change flower vase water once a week to prevent dengue mosquito breeding
- Wrap all unused plastic tyres
- Regularly change water in animal drinking containers
- Use mosquito repellents to avoid mosquito bite
- Use mosquito screen to prevent mosquito attack

- Use aerosols and mosquito coils to kill mosquitoes
- Wear long sleeve and fully covered clothes
- Use mosquitoes net around bed while sleeping

#### Measures To Be Taken During Dengue Fevers

- Patient infected by dengue fever must follow these measures:
- Get a blood test by microbiological laboratory
- Take plenty of water and cold fluids
- Bath in cold water and place ice bag over abdomen and head
- Don't take aspirin
- Get proper medical checkup
- Add few drops of lemon in apple juice and then drink.<sup>20</sup>

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