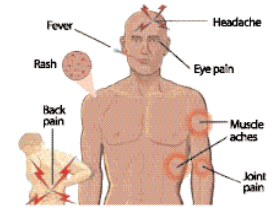


Dengue: symptoms and spread



Dengue has emerged as a major public health problem. The primary vector mosquito has spread throughout the tropics and into susceptible human populations in urban areas. The urbanization process, which has left many without adequate water, sewer systems or waste management and created new breeding grounds for the vector, has hastened the spread of the disease. Vector control has not halted the explosion in transmission of the disease. Dengue is transmitted by the bite of an Aedes mosquito infected with any one of the four

dengue viruses. It occurs in tropical and sub-tropical areas of the world. Symptoms appear 3-14 days after the infective bite. Dengue fever is a febrile illness that affects infants, young children and adults. Symptoms range from a mild fever, to incapacitating high fever, with severe headache, pain behind the eyes, muscle and joint pain, and rash. There are no specific antiviral medicines for dengue. It is important to maintain hydration. Use of acetylsalicylic acid (e.g. aspirin) and non steroidal anti-inflammatory drugs (e.g. ibuprofen) is not recommended.

**DENGUE FEVER** is an acute viral disease caused by the **Flavivirus** of the family **Flaviviridae**. The term "dengue" is a Spanish attempt at the Swahili phrase "*Ki denga pepo*" meaning "*cramp-like seizure*" caused by an evil spirit. It's a disease of tropical and subtropical regions that occurs epidemically, very much similar to chikungunya. This disease is also called "*breakbone*" fever because it sometimes causes severe joint & muscle pain that feels like bones are breaking, hence the name.



# Dengue

## How dengue spreads?

Dengue fever is noncontagious i.e., not an airborne infection (an infected person cannot spread the infection to other persons but can be a source of dengue virus for mosquitoes for about 6 days from the start of symptoms). Mosquito bite spreads dengue and malaria. Dengue virus is transmitted to humans through mosquito bites, a specific species of mosquito usually *Aedes aegypti* (but frequently *Aedes albopictus*) which bites during morning hours. The mosquito transmits disease by biting an infected person and then biting someone else, similar to the spread of chikungunya. The incubation period (i.e., period from infection till the manifestation of symptoms) is 4 to 6 days, but may vary with a range of 3 to 14 days. This disease is a vector borne infection i.e., mosquito is the vector (carrier) of the virus believed to cause this fever and the vector is common both in dengue and chikungunya.

## Dengue severity classification

Four grades of severity are recognized:  
**Grade I**, fever and constitutional symptoms;  
**Grade II**, grade I plus spontaneous bleeding (of skin, gums, or gastrointestinal tract);  
**Grade III**, grade II plus agitation and circulatory failure;  
**Grade IV**, profound shock.

## Dengue synonyms

Exanthema arthrosia, Aden fever, bouquet fever, breakbone fever, dandy fever, date fever, dengue fever, dengue hemorrhagic fever, polka fever, solar fever, scarlatina rheumatica.

## Dengue diagnosis

Dengue fever can be diagnosed by performing blood test to detect antibodies against the virus.

## Dengue treatment and prognosis

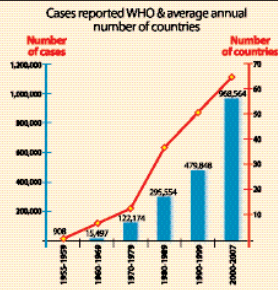
Prognosis for dengue fever is good. If the infectious disease is treated on time. However the mortality rate can be as high as 15%. Hence immediate medical attention should be sought in suspected cases with dengue fever.

## Impact of Dengue

During the 19th century, dengue was considered a sporadic disease that caused epidemics at long intervals, a reflection of the slow pace of transport and limited travel at that time. Today, dengue ranks as the most important mosquito-borne viral disease in the world. In the last 50 years, incidence has increased 30-fold. An estimated 2.5 billion people live in over 100 endemic countries

and areas where dengue virus can be transmitted. Up to 50 million infections occur annually with 500 000 cases of dengue haemorrhagic fever and 22,000 deaths mainly among children. Prior to 1970, only 9 countries had experienced cases of dengue haemorrhagic fever (DHF); since then the number has increased more than 4-fold and continues to rise.

## Average annual number of DF/DHF



## Dengue haemorrhagic fever

Dengue is the most common mosquito-borne viral disease of humans that in recent years has become a major international public health concern. Globally, 2.5 billion people live in areas where dengue viruses can be transmitted. The geographical spread of both the mosquito vectors and the viruses has led to the global resurgence of epidemic dengue fever and emergence of dengue haemorrhagic fever (dengue/DHF) in the past 25 years with the development of hyperendemicity in many urban centers of the tropics.

Transmitted by the main vector, the *Aedes aegypti* mosquito, there are four distinct, but closely related, viruses that cause dengue. Recovery from infection by one provides lifelong immunity against that serotype but confers only partial and transient protection against subsequent infection by the other three. There is good evidence that sequential infection increases the risk of more serious disease resulting in DHF. DHF was first recognized in the 1950s during the dengue epidemics in the Philippines and Thailand. By 1970 nine countries had experienced epidemic DHF and now, the number has increased more than fourfold and continues to rise. Today emerging DHF cases are causing increasing dengue epidemics in the Americas, and in Asia, where all four dengue viruses are endemic, DHF has become a leading cause of hospitalization and death among children in several countries.

## Know the Aedes mosquito

Dr. K. D. R. Jayatilaka

*Aedes aegypti* mosquitoes generally known as a container breeder normally breed in pure water which is not very deep. Sometimes it could breed even in slightly polluted or slightly brackish water. It takes 7-9 days for the mosquito to develop from the egg to the flying adult. There are about 950 species of *Aedes* mosquitoes in the world of which about 180 species exist in the South East Asian countries and in Sri Lanka about 18 species are present.

However, *Ae. aegypti* and the related variety *Ae. albopictus* are the known important vectors of diseases like dengue, chikungunya, yellow fever and other viral diseases which are very dangerous. These mosquitoes in addition to their capacity of being vectors of fatal or incapacitating diseases which cause epidemics are a serious biting nuisance to humans as well as animals.

Adult mosquitoes live up to about 60 days under natural environment in the wild. The female mosquito needs only once, very often immediately after coming out of the breeding place, but produce eggs at intervals throughout its life. Only the female mosquitoes take a blood meal either from humans or animals for its survival and maturation of eggs which she lays in a suitable place.

each 2-5 days depending on the surrounding temperature and humidity.

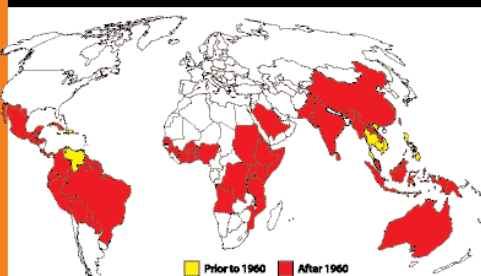
After the blood meal these gravid females rest on soft, dark, humid places like bush and the brush or under fallen branches and tree holes etc. outdoors or under surfaces of furniture, hanging cloths, curtains, and hangings etc. inside houses and out-houses all the eggs mature. After laying the eggs in a suitable place, they go in search of another blood meal. *Ae. aegypti* prefers human blood to animal blood and the peak biting hours are about 2 hours before sunset and about 2 hours after sunrise. This does not mean that they strictly adhere to these meal times as we frequently hear during various community education sessions these days, but a hungry mosquito will bite for a blood meal at any time during day or night.

*Aedes* mosquito is usually characterized as a very nervous feeder, i.e. it gets disturbed and flies away at the slightest movement of the victim (pray) but comes back within a very short time either to the same or to a different person to feed till it gets the full blood meal. This is why one infective mosquito trapped inside a house could infect a number of people or the whole family in the house during a feeding session in the day or the night. The mosquito picks up the dengue virus from a

dengue patient during feeding and the mosquito gets infected. The infected mosquito will have to live for a period of about 7 days for the virus inside the mosquito to go through a process of maturation/changes and the mosquito becomes infective.

This period 4-12 days average 7 days from the time it gets infected to the time it becomes infective is known as the extrinsic incubation period of the dengue virus. After this each time the infective *Aedes* mosquito bites a person to get the blood meal it could inject some virus into the victim. If the victim is a human who is not exposed to the same serotype of dengue virus he will become a dengue patient after another 5-12 days (average 6 days). This time interval between the infective bite and the appearance of signs and symptoms of dengue in the patient is referred to as the incubation period of the disease. There are 4 serotypes of dengue virus D1, D2, D3 and D4 and all these four types are present in Sri Lanka today. The proportion of infective mosquitoes in the mosquito population at any time depends on (a) Density of *Aedes* mosquitoes, (b) Number of dengue patients in the area and (c) Longevity or the survival rate of the infected mosquito. Often the mosquito gets killed during the process of feeding and waiting period for the feed.

## Emergency of DEN / DHF



Courtesy who.int / mtherald.com / 3.naid.nih.gov

## Geographic spread

Dengue and dengue haemorrhagic fever are present in urban and suburban areas in the Americas, South and South-East Asia, the Eastern Mediterranean and the Western Pacific and dengue fever is present mainly in rural areas in Africa.

Several factors have combined to produce epidemiological conditions in developing countries in the tropics and subtropics that favour viral transmission by the main mosquito vector, *Aedes aegypti*: rapid population growth, rural-urban migration, inadequate basic urban infrastructure (eg.

unreliable water supply leading householders to store water in containers close to homes) and increase in volume of solid waste, such as discarded plastic containers and other abandoned items which provide larval habitats in urban areas.

Geographical expansion of the mosquito has been aided by international commercial trade particularly in used tyres which easily accumulate rainwater. Increased air travel and breakdown of vector control measures have also contributed greatly to the global burden of dengue and DHF.



## How to prevent dengue?

- ▶ Avoiding mosquito bites (by using mosquito repellents containing DEET, picaridin (KBR3023) or oil of lemon eucalyptus)
- ▶ Eliminating pockets of stagnant water that serve as mosquito breeding sites at home, workplaces and their vicinity
- ▶ Not storing water in open containers. Covering all water containers with lids
- ▶ Preventing mosquito entry by keeping doors closed and windows screened
- ▶ Wearing protective clothing like long-sleeved shirts, long pants, socks and shoes when outdoors
- ▶ Using mosquito nets at home
- ▶ Scrubbing and cleaning margins of containers used for water (to dislodge the eggs of *Aedes aegypti*)
- ▶ Covering overhead tank to prevent access to mosquitoes
- ▶ *Aedes* mosquitoes usually bite during the day; therefore, special precautions should be taken during early morning hours before day break and in the late afternoon before dark
- ▶ There is no commercially available dengue vaccine (for dengue Flavivirus)