

Chikungunya

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General

Chikungunya (pronounced 'chicken-gun-ya') is an arboviral disease transmitted to humans by infected *Aedes* and *Culex* mosquitoes in particular by *A aegypti* and *A albopictus* (Asian tiger mosquito). The word 'chikungunya' comes from the Makonde language meaning 'that which bends up' and refers to the crippling arthritis that occurs in >25% of infected people and who may still be symptomatic 3 – 5 years afterwards. The disease was first observed in Tanzania in 1952-1952 and sporadic outbreaks following unexplained silent periods have occurred ever since. Major outbreaks occurred in 2005 and 2006 in the Mascarene islands of the Indian Ocean and the disease is now reaching endemic proportions in India and in many SE Asian countries and in parts of Africa. Monkeys form the main reservoir for the disease.

The clinical disease

Asymptomatic Asymptomatic chikungunya is common but the incidence is not yet known. Seropositivity may approach 100% in endemic areas and it is reasonable to assume that many of such people either had an asymptomatic attack of chikungunya in the past or a very mild unnoticed incident.

Incubation period: Chikungunya has an incubation period of 2 – 12 days with an average of 2 -4 days.

Symptoms: Chikungunya virus (CHIKV) like the dengue virus (DenV) affects the patient abruptly causing the FAR group of symptoms (fever, arthralgia, rash). Unlike dengue it does not cause capillary leakage, bleeding or shock. However the fever can be very high (>40°C) and the arthralgia so bad that the patient can hardly move. The rash is variable and may be maculo papular or morbilliform. It usually occurs on the trunk or proximal part of the limbs. All grades of disease severity occur and recovery in a week or so is the rule apart from residual arthralgia in about 12% of those so affected. As with many viral infections post viral fatigue can be a problem for many months after the initial illness.

Immunity: Chikungunya confers life long immunity

Pregnancy: Pregnant women contract chikungunya just as readily as the rest of the population and exhibit the same symptoms. There is no evidence that CHIKV can pass from mother to child apart from a report from Reunion where mother to child transfer was suggested.

However if the mother is heavily viremic it is possible the infant can acquire the disease at parturition. Meningoencephalitis can ensue in the newborn and this is a very serious complication of the disease.

There is some evidence that CHIKV is associated with abortion if acquired in the first trimester.

DEET (<50%), picaridin or oil of lemon eucalyptus are not contraindicated in pregnancy and should be used to prevent mosquito bites in at-risk persons.

Breast feeding: Is not contraindicated since the virus does not appear to be transmitted through the mother's milk.

Fatalities

It was estimated that about 200 fatalities occurred in one outbreak in India. However these deaths only occurred in vulnerable people (elderly, concomitant disease, malnutrition). CHIKV itself does not appear to be directly responsible for death.

Relation to Dengue

It might be suggested that because CHIKV is an alpha virus it is less virulent than the DenV flavivirus. However the genus of a virus bears no consistent relation to its virulence. Thus an alphavirus can be very virulent e.g. the triple E virus, Venezuelan equine encephalitis while a flavivirus e.g. GB virus C (GBV-C) can be harmless. However the clinical illness caused by both CHIKV and DenV are very similar. Both are transmitted by the same mosquitoes, both have a short incubation period, both have a similar viremic duration, both are usually short lived self limiting illnesses. Finally CHIKV is only found in areas where dengue is endemic although dengue is also found in areas where chikungunya is absent. Sometimes it is very hard to distinguish the two without serology in which case the degree of thrombocytopenia may be helpful. During the 2007 chikungunya outbreak in Italy only one patient had a platelet count < 150,000 whereas a much lower platelet count is the rule in dengue.

Transmission of the CHIK virus

The virus is transmitted only by mosquitoes

The mosquito picks up the virus from an infected person during the viremic period which is within five days from the start of symptoms (a similar situation pertains to the transmission of dengue)

An infected mosquito will remain infected all its life span and can transmit the virus each time it bites

An infected person cannot spread the infection directly to other persons

Factors facilitating spread of chikungunya

- Population explosion, overcrowding
- Competition for food
- Population movements (migration, air travel, displaced persons, refugees)
- Increasing world trade
- Globalization
- Deforestation
- Global warming
- Floods
- Unplanned urbanization
- Poor sanitation
- Improper disposal of garbage and pollution of aquatic systems
- Vectors developing resistance to insecticides

Epidemiology

At present CHIK is endemic in India, the islands of the southwest Indian Ocean and in Africa. In 2009 very large outbreaks were reported from Reunion, Thailand and Malaysia

Travel

Since 2005 chikungunya has been reported in travellers returning from endemic areas to Europe (especially France and Italy), Singapore, Hong Kong, Taiwan, Canada and the United States. Some examples illustrate this.

France: A cluster of cases returned from Senegal in 2006. Most were based in towns north of Dakar and the longest stay was 30 days. All presented with the FAR complex in which the skin exanthems varied considerably. All were IgM and IgG positive for CHIKV and none had a positive malaria smear.

Italy: A large outbreak of chikungunya involving several hundred people took place in the Ravenna area in 2007. There was one death in an 83 year old man who had an underlying illness. The outbreak followed the occurrence of 17 imported cases in travellers from endemic areas in India and the Far East. The local transmitting agent was *A albopictus* which is currently spreading widely in southern Europe and in North America. The advance of *A albopictus* may well drive the geographic location of chikungunya fever beyond its present bounds.

Singapore: A sequence of events similar to that in Italy occurred in Singapore. In Singapore CHIKV was reported in 8 travellers who had visited friends and relatives in India (7) and Malaysia (1). A year later (2008) an outbreak of CHIK occurred in Singapore in persons *who had no history of overseas travel* in the previous few years. This second outbreak was attributed to the presence of a vector *aedes* in Singapore and its ability to transmit CHIKV from human to human in the absence of a monkey or wild animal reservoir.

Treatment and Vaccine

There is no specific treatment for and no vaccine available against chikungunya. Aspirin is avoided because of the theoretical danger of bleeding. Protective measures must be taken using mosquito repellents (DEET, Picaridin, Oil of Lemon Eucalyptus) and the elimination of mosquitoes, especially of *A albopictus*, is a priority. I can find no scientific basis to show that 'Triphala', an ayurvedic mixture of three fruits, has any specific anti-CHIKV properties although anecdotal evidence suggests it may ease the associated arthritic pain.

Note of caution: Analysis of a recent outbreak of chikungunya has suggested that an apparent increased severity of the disease may be due to a change in the genetic sequence, altering the virus' coat protein, which potentially allows it to multiply more easily in mosquito cells.