

# CHIKUNGUNYA-AN OVERVIEW

D.BHOWMIK, MARGRET CHANDIRA,CHIRANJIB, B.JAYAKAR

VINAYAKA MISSION UNIVERSITY,SALEM  
TAMILNADU,INDIA

## ABSTRACT

Chikungunya is a relatively rare form of viral fever caused by an alphavirus that is spread by mosquito bites from the *Aedes aegypti* mosquito. The symptoms of Chikungunya (also called as Chicken Guinea) include fever which can reach 39°C, (102.2 °F) a petechial or maculopapular rash usually involving the limbs and trunk, and arthralgia or arthritis affecting multiple joints which can be debilitating. There can also be headache, conjunctival infection and slight photophobia. In the present epidemic in the state of Andhra Pradesh in India, high fever and crippling joint pain is the prevalent complaint. Fever typically lasts for two days and abruptly comes down, however joint pain, intense headache, insomnia and an extreme degree of prostration lasts for a variable period, usually for about 5 to 7 days. The symptoms of Chikungunya include fever which can reach 39°C, (102.2°F) a petechial or maculopapular rash usually involving the limbs and trunk, and arthralgia or arthritis affecting multiple joints which can be debilitating. The symptoms could also include headache, conjunctival injection, and slight photophobia. High fevers and joint pain are found in the current epidemic in the states of Andhra Pradesh and Tamil Nadu, India. The fever typically lasts for two days and then comes down abruptly. However, other symptoms, namely joint pain, intense headache, insomnia and an extreme degree of prostration last for a variable period; usually for about 5 to 7 days. Patients have complained of joint pains for much longer time periods depending on their age. Younger patients recover within 5 to 15 days; middle-agers recover in 1 to 2.5 months. Recovery is longer for the elderly. The severity of the disease as well as its duration is less in younger patients and pregnant women. No untoward effects of pregnancy are noticed following the infection.

## INTRODUCTION

Chikungunya virus, also known as buggo creek virus, is transmitted by *Aedes aegypti* mosquito bites. The virus belongs to the family *Togaviridae*, and the genus is *Alpha virus*. Till date there has been no reported direct person-to-person spread. The mosquitoes that cause infection due to the chikungunya virus in Africa and Asia are the same mosquitoes that cause yellow fever and dengue fever in many parts of the world. Hence many parts of the world could be affected by the chikungunya virus. Genetic analysis of the chikungunya viruses reveal that there are two distinct types of the virus - one contains all isolates from western Africa and the second comprising all southern and east African strains, as well as isolates from Asia. Chikungunya fever is a viral disease transmitted to humans by the bite of infected mosquitoes. Chikungunya virus (CHIKV) is a member of the genus *Alphavirus*, in the family *Togaviridae*. CHIKV was first isolated from the blood of a febrile patient in Tanzania in 1953, and has since been identified repeatedly in west, central and southern Africa and many areas of Asia, and has been cited as the cause of numerous human epidemics in those areas since that time. The virus circulates throughout much of Africa, with transmission thought to occur mainly between mosquitoes and monkeys must feed at least once upon mammalian blood before their eggs can develop properly. The males may have beaks, or probosces, but cannot pierce, and they feed upon fruit and plant juices. The female produces the characteristic whining sound by vibrating thin horny membranes on the thorax. The eggs are laid singly or glued together to form rafts, usually in stagnant water in ponds, pools, open containers, and other aquatic habitats—the particular type of habitat depending on the species. The aquatic larvae, or wrigglers, pass through four larval stages, feeding on microscopic animal and plant life. Except in the genus *Anopheles*, the wriggler has an air tube near the end of the abdomen and makes frequent trips to the surface to use it as a supplement to the gills. The pupa, or tumbler, shaped like a question mark, takes no food but surfaces often to breathe through air tubes on its thorax. One method of mosquito control is the spreading of oily substances on infested water, which prevents access to air and suffocates the pupae. In summer the life cycle may take only two weeks, resulting in several generations a year in some species. During the blood meals the females may either acquire or transmit various disease organisms. Many species of *Anopheles* mosquitoes, recognizable by their tilted resting position, carry the protozoan parasites that cause malaria. The females of most species have piercing and sucking mouth parts and apparently they no vaccine or specific antiviral treatment for chikungunya fever is available. Treatment is symptomatic--rest, fluids, and ibuprofen, naproxen, acetaminophen, or paracetamol may relieve symptoms of fever and aching. Aspirin should be avoided. Infected persons should be protected from further mosquito exposure (staying indoors and/or under a mosquito net during the first few days of illness) so that they can't contribute to the transmission cycle. Chikungunya was first described in Tanzania, Africa surrounded by 1952. The first outbreak in India was in 1963 surrounded by Calcutta.[4] An outbreak of

chikungunya was also discovered contained by Port Klang in Malaysia surrounded by 1999 affecting 27 people. The most powerful means of prevention are those that protect against any contact near the disease-carrying mosquitos. These include using insect repellent containing NNDB, DEET or permethrin, wearing long sleeves and trousers (pants), and securing screens on window and doors. It's also important to neglected stagnant water where on earth mosquitoes breed. Chikungunya virus is indigenous to tropical Africa and Asia, where it is transmitted to humans by the bite of infected mosquitoes, usually of the genus *Aedes*. Chikungunya virus belongs to alpha-virus under Toga viridae family. It is an "Arbovirus" (Ar-arthropod, bo-borne). CHIK fever epidemics are sustained by human-mosquito-human transmission. The word "chikungunya" is thought to derive from description in local dialect of the contorted posture of patients afflicted with the severe joint pain associated with this disease. The main virus reservoirs are monkeys, but other species can also be affected, including humans

## HISTORY

The name is derived from the Makonde word meaning "that which bends up" in reference to the stooped posture developed as a result of the arthritic symptoms of the disease. The disease was first described by Marion Robinson and W.H.R. Lumsden in 1955, following an outbreak in 1952 on the Makonde Plateau, along the border between Mozambique and Tanganyika (the mainland part of modern day Tanzania). According to the initial 1955 report about the epidemiology of the disease, the term chikungunya is derived from the Makonde root verb *kungunyala*, meaning to dry up or become contorted. In concurrent research, Robinson glossed the Makonde term more specifically as "that which bends up." Subsequent authors apparently overlooked the references to the Makonde language and assumed that the term derived from Swahili, the lingua franca of the region. The erroneous attribution of the term as a Swahili word has been repeated in numerous print sources. Many other erroneous spellings and forms of the term are in common use including "Chicken guinea", "Chicken gunaya," and "Chickengunya. Since its discovery in Tanganyika, Africa in 1952, chikungunya virus outbreaks have occurred occasionally in Africa, South Asia, and Southeast Asia, but recent outbreaks have spread the disease over a wider range.

## SYMPTOMS

The incubation period of Chikungunya disease is from two to four days. Symptoms of the disease include a fever up to 40 °C (104 °F), a petechial or maculopapular rash of the trunk and occasionally the limbs, and arthralgia or arthritis affecting multiple joints.<sup>[4]</sup> Other nonspecific symptoms can include headache, conjunctival infection, and slight photophobia. Typically, the fever lasts for two days and then ends abruptly. However, other symptoms, namely joint pain, intense headache, insomnia and an extreme degree of prostration last for a variable period; usually for about 5 to 7 days.<sup>[4]</sup> Patients have complained of joint pains for much longer time periods depending on their age.

Fever (> 40 C, 104 F)

Headache

Joint pain (or arthralgia)

Arthritis affecting multiple joints that can be debilitating.

Swelling of Joints

Rash (May occur rarely)

Sometimes there maybe infection of the conjunctiva of the eye and some photophobia.

Chills

Nausea

Vomiting

Bleeding or hemorrhage (May occur rarely).

In one study over 12% of patients who contract Chikungunya virus infection develop chronic joint symptoms.

Symptoms -- The symptoms of Chikungunya are very similar to those of dengue fever. It is characterized by high fever which can reach up to 104 degree F. There will be a sudden onset of flu-like symptoms, including severe headache, chills, rash, fatigue, nausea, vomiting, myalgia and joint pain. The joints of the extremities will become swollen and painful to touch.

Treatment- No specific treatment is available. Symptomatic treatment can be given to help the patient. Nimesulide+PCM Tab. are useful to relieve pain.

## **DIAGNOSIS**

Common laboratory tests for chikungunya include RT-PCR, virus isolation, and serological tests.

- ❖ Virus isolation provides the most definitive diagnosis but takes 1–2 weeks for completion and must be carried out in Biosafety level 3 laboratories.<sup>[7]</sup> The technique involves exposing specific cell lines to samples from whole blood and identifying chikungunya virus-specific responses.
- ❖ RT-PCR using nested primer pairs to amplify several Chikungunya-specific genes from whole blood. Results can be determined in 1–2 days.

Serological diagnosis requires a larger amount of blood than the other methods and uses an ELISA assay to measure Chikungunya-specific IgM levels. Results require 2-3 days and false positives can occur with infection via other related viruses such as O'nyong'nyong virus and Semliki Forest Virus

## ***PREVENTION***

The most effective means of prevention are protection against contact with the disease-carrying mosquitoes and mosquito control. These include using insect repellents with substances like DEET (N,N-Diethyl-meta-toluamide; also known as N,N'-Diethyl-3-methylbenzamide or NNDB), icaridin (also known as picaridin and KBR3023), PMD (p-menthane-3,8-diol, a substance derived from the lemon eucalyptus tree), or IR3535. Wearing bite-proof long sleeves and trousers (pants) also offers protection. In addition, garments can be treated with pyrethroids, a class of insecticides that often has repellent properties. Vaporized pyrethroids (for example in mosquito coils) are also insect repellents. Securing screens on windows and doors will help to keep mosquitoes out of the house. In the case of the day active *Aedes aegypti* and *Aedes albopictus*, however, this will only have a limited effect, since many contacts between the vector and the host occur outside.

## **TREATMENT**

There are no specific treatments for Chikungunya. There is no vaccine currently available. A Phase II vaccine trial, sponsored by the US Government and published in the American

Journal of Tropical Medicine and Hygiene in 2000, used a live, attenuated virus, developing viral resistance in 98% of those tested after 28 days and 85% still showed resistance after one year.

Chloroquine is gaining ground as a possible treatment for the symptoms associated with chikungunya and as an antiviral agent to combat the Chikungunya virus. A University of Malaya study found that for arthritis-like symptoms that are not relieved by aspirin and non-steroidal anti-inflammatory drugs (NSAID), chloroquine phosphate (250 mg/day) has given promising results.[23] Research by an Italian scientist, Andrea Savarino, and his colleagues together with a French government press release in March 2006 have added more credence to the claim that chloroquine might be effective in treating chikungunya. Unpublished studies in cell culture and monkeys show no effect of chloroquine treatment on reduction of chikungunya disease. The fact sheet on Chikungunya advises against using aspirin, Ibuprofen, naproxen and other pain and fever.

Infected persons should limit further exposure to mosquito bites, stay indoors and under a mosquito net. Further, "supportive care with rest is preferred during the acute joint symptoms. Movement and mild exercise tend to improve stiffness and morning arthralgia, but heavy exercise may exacerbate rheumatic symptoms." Arthralgia remains troublesome even after 8 months. In Kerala, patients use honey and lime mix. Some people cite relief from consuming turmeric in low volumes.

## **PREVENTIVE MEASURES**

The most effective means of prevention are those that protect against any contact with the disease-carrying mosquitos. These include using insect repellents with substances like DEET (also called NNDB or N,N'-Diethyl-3-methylbenzamide), icaridin (also known as picaridin and KBR3023), PMD (p-menthane-3,8-diol, a substance derived from the lemon eucalyptus tree), or IR3535. Wearing bite-proof long sleeves and trousers (pants) also offers protection. In addition, garments can be treated with pyrethroids, a class of insecticides that often has repellent properties. Vaporized pyrethroids (for example in mosquito coils) also have a certain spacial repellency. Securing screens on windows and doors will help to keep mosquitoes out of the house. In the case of the day active *Aedes aegypti* and *Aedes albopictus*, however, this will only have a limited effect, since many contacts between the vector and the host occur outside. Thus, mosquito control is especially important.

## **CHIKUNGUNYA IN INDIA**

Chikungunya is a relatively rare form of viral fever caused by an alphavirus that is spread by mosquito bites from the *Aedes aegypti* mosquito (Tiger mosquito). It is mainly in Africa and South East Asia, including India, the disease is new to Gulbarga

Chikungunya is generally not fatal. However, in 2005-2006, 200 deaths have been associated with chikungunya on Réunion island and a widespread outbreak in Southern India (especially in Tamil Nadu, Karnataka, Kerala, and Andhra Pradesh). As of July 2006, Tamil Nadu reportedly had the largest number of cases, specifically centered around the southern districts of Madurai and Tirunelveli. The number of reported cases also registered a great increase in the districts of Salem, Chennai, and Chengalpattu. As of September 2006, after the flood and heavy rains in Rajasthan in August 2006, India, thousands of cases have been detected in Rajsamand, Bhilwara, Udaipur, and Chittorgarh districts. As of October 3, 2006 in the southern Indian state of Kerala, 92 deaths are attributed to Chikungunya and majority of the casualties were reported in the district of Alappuzha. This latest outbreak in Alappuzha is supposed to have transferred from Parassala, the southernmost point of Kerala state where a recent outbreak were reported before the episodes of Alappuzha started.

## **DNA VACCINE**

DNA vaccination is a technique for protecting an organism against disease by injecting it with genetically engineered DNA to produce an immunological response. Nucleic acid vaccines are still experimental, and have been applied to a number of viral, bacterial and parasitic models of disease, as well as to several tumor models. DNA vaccines have a number of advantages over conventional vaccines, including the ability to induce a wider range of immune response types. A recent study report that a novel consensus-based approach to vaccine design for Chikungunya virus, employing a DNA vaccine strategy. The vaccine cassette was designed based on CHIKV Capsid and Envelope specific consensus sequences with several modifications, including codon optimization, RNA optimization, the addition of a Kozak sequence, and a substituted immunoglobulin E leader sequence. Analysis of cellular immune responses, including epitope mapping, demonstrates that these constructs induces both potent and broad cellular immunity in mice. In addition, antibody ELISAs demonstrate that these synthetic immunogens are capable of inducing high titer antibodies capable of recognizing native antigen. Taken together, these results support further study of the use of consensus CHIKV antigens in a potential vaccine cocktail

## **European Centers for Disease Control Rep Recommendations:**

- ❖ If there is stagnant water near sites / offices / residential colonies notify Health / Sanitary authority for drainage / anti larva measures ( spray of insecticides)
- ❖ Drain stagnant water from potted plants, air coolers, old tins, old tyres etc.
- ❖ Enforce stringent sanitary measures in and around our sites to reduce mosquito population by fogging and spraying pesticides.
- ❖ To avoid mosquito bites:
  - Use mosquito repellent creams while going outdoors
  - Ensure mosquito nets on windows
  - Use electric insecticide vapourisers as indoor mosquito repellants
  - Use mosquito nets in highly endemic areas
- ❖ Do not ignore fever (with or without chills) more than 38°C / 104°F. Consult your family physician
- ❖ All local coordinators/ site in charge and doctors are requested to translate this information into local language and spread awareness.
- ❖ In case you have a suspect case please provide us information about location, telephone number of the employees, his / her attending physician's / hospitals for follow up and better coordination in order to provide best healthcare.

## **SUMMARY**

Chikungunya is generally spread through bites from *Aedes aegypti* mosquitoes, but recent research by the Pasteur Institute in Paris has suggested that chikungunya virus strains in the 2005-2006 Reunion Island outbreak incurred a mutation that facilitated transmission by *Aedes albopictus* (Tiger mosquito). Concurrent studies by arbovirologists at the University of Texas Medical Branch in Galveston Texas confirmed definitively that enhanced chikungunya virus infection of *Aedes albopictus* was caused by a point mutation in one of the viral envelope genes (E1). Enhanced transmission of chikungunya virus by *Aedes albopictus* could mean an increased risk for chikungunya outbreaks in other areas where the Asian tiger mosquito is present. A recent epidemic in Italy was likely perpetuated by *Aedes albopictus*. In Africa, chikungunya is spread via a sylvatic cycle in which the virus largely resides in other primates in between human outbreaks. Recovery from the disease varies by age. Younger patients recover within 5 to 15 days; middle-aged patients recover in 1 to 2.5 months. Recovery is longer for the elderly. The severity of the disease as well as its duration is less in younger patients and pregnant women. In pregnant women, no untoward effects are noticed after the infection. Ocular inflammation from Chikungunya may present as iridocyclitis, and have retinal lesions as well. Pedal edema (swelling of legs) is observed in many patients, the cause of which remains obscure as it is not related to any cardiovascular, renal or hepatic abnormalities. No vaccine or specific antiviral treatment for chikungunya fever is available. Treatment is symptomatic--rest, fluids, and ibuprofen, naproxen, acetaminophen, or paracetamol may relieve symptoms of fever and aching. Aspirin should be avoided. Infected persons should be protected from further mosquito exposure (staying indoors and/or under a mosquito net during the first few days of illness) so that they can't contribute to the transmission cycle. Also the current finding is that the Chicken gunia is a disease infected through a special Mosquito and the best precaution is to keep ourselves from its bite. This mosquito's bite only happens in day time only since we are careless about mosquito bite in day time, in order to prevent its bite we have to take steps to prevent by keeping mosquitoes away from our surroundings. Use insect repellent containing an DEET or another EPA-registered active ingredient on exposed skin. Always follow the directions on the package. Wear long sleeves and pants (ideally treat clothes with permethrin or another repellent). Have secure screens on windows and doors to keep mosquitoes out. Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets and barrels. Change the water in pet dishes and replace the water in bird baths weekly. Drill holes in tire swings so water drains out. Keep children's wading pools empty and on their sides when they aren't being used. Additionally, a person with chikungunya fever or dengue should limit their exposure to mosquito bites in order to avoid further spreading the infection. The person should stay indoors or under a mosquito net.

## REFERENCES

1. de Lamballerie X, Leroy E, Charrel RN, Tsetsarkin K, Higgs S, Gould EA (2008). "Chikungunya virus adapts to tiger mosquito via evolutionary convergence: a sign of things to come?". *Viol. J.* 5: 33. doi:10.1186/1743-422X-5-33. PMID 18304328.
2. Powers AM, Logue CH (2007). "Changing patterns of chikungunya virus: re-emergence of a zoonotic arbovirus" (PDF). *J. Gen. Virol.* 88 (Pt 9): 2363–77. doi: 10.1099/vir.0.82858-0. [PMID 17698645](#).  
<http://www.sgm.ac.uk/jgvdirect/82858/82858ft.pdf>. Retrieved on 2008-03-19.
3. Sourisseau M, Schilte C, Casartelli N, *et al* (June 2007). "Characterization of reemerging chikungunya virus". *PLoS Pathog.* 3 (6): e89. doi:10.1371/journal.ppat.0030089. [PMID 17604450](#). PMC: 1904475.  
<http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=17604450>. Retrieved on 2008-07-14.
4. <sup>a b</sup> Chhabra M, Mittal V, Bhattacharya D, Rana U, Lal S (2008). "Chikungunya fever:". *Indian J Med Microbiol* 26 (1): 5–12. [PMID 18227590](#).
5. Simon F, Parola P, Grandadam M, Fourcade S, Oliver M, Brouqui P, Hance P, Kraemer P, Ali Mohamed A, de Lamballerie X, Charrel R, Tolou H (2007). "Chikungunya infection: an emerging rheumatism among travelers returned from Indian Ocean islands. Report of 47 cases". *Medicine (Baltimore)* 86 (3): 123–37. doi:10.1097/MD/0b013e31806010a5. [PMID 17505252](#).
6. Taubitz W, Cramer JP, Kapaun A, Pfeffer M, Drosten C, Dobler G, Burchard GD, Löscher T (2007). "Chikungunya fever in travelers: clinical presentation and course". *Clin. Infect. Dis.* 45 (1): e1–4. doi:10.1086/518701. [PMID 17554689](#).
7. <sup>a b c</sup> "WHO - Laboratory Diagnosis of Chikungunya Fevers".  
[http://www.searo.who.int/EN/Section10/Section2246\\_12902.htm](http://www.searo.who.int/EN/Section10/Section2246_12902.htm). Retrieved on 2008-07-11.
8. Morbidity and Mortality Weekly Report, September 29, 2006 / 55(38);1040-1042
9. \*"Chikungunya - Fact sheet". European Centre for Disease Prevention and Control. 2008-01-23.  
[http://ecdc.europa.eu/en/Health\\_Topics/Chikungunya\\_Fever/facts.aspx](http://ecdc.europa.eu/en/Health_Topics/Chikungunya_Fever/facts.aspx). Retrieved on 2008-03-25.
10. Edelman, R; C.O. Tacket, S.S. Wasserman, S.A. Bodison, J.G. Perry, J.A. Mangiafico (01 June 2006). "Phase II Safety and Immunogenicity Study of Live Chikungunya Virus Vaccine TSI-GSD-218" (PDF). *American Journal of Tropical Medicine and Hygiene* 62 (6): 681–685. [PMID 11304054](#).  
<http://www.ajtmh.org/cgi/reprint/62/6/681>. Retrieved on 2007-12-24.