



## ZIKA VIRUS - A REVIEW ON PAST, PRESENT AND FUTURE SCENARIO

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**Abstract:** *Zika virus is transmitted to people through aedes mosquito bites. People with Zika virus disease usually have symptoms of mild fever, exanthema (skin rash), joint pain and conjunctivitis that normally last for 2-7 days. There is no specific treatment or vaccine currently available. The best form of prevention is protection against mosquito bites. The virus is known to circulate in Africa, the Americas, Asia and the Pacific. The present paper deals with various modes of transmission, symptoms, diagnosis and preventive measures. A brief discussion about the role of various departments for control and prevention of zika virus. The available means for treatment of zika virus were also indicated.*

**Keywords:** *Zika virus, mosquito bite, diagnosis, treatment, vaccine, prevention*

### INTRODUCTION

Zika virus is a member of the *Flaviviridae* virus family and the *Flavivirus* genus, transmitted by *Aedes* mosquitoes, such as *A. aegypti* which are day-time active<sup>1</sup>. Zika virus is an emerging mosquito-borne virus that was first identified in Uganda in 1947<sup>2</sup> in rhesus monkeys through a monitoring network of sylvatic yellow fever research institute and it was isolated for the first time from humans in Nigeria. Outbreaks of Zika virus disease have been recorded in Africa, the Americas, Asia and the Pacific. Zika virus is related to dengue, yellow fever, Japanese encephalitis, and West Nile viruses<sup>2</sup>. The illness it causes is similar to a mild form of dengue fever. It cannot be prevented by drugs or vaccines<sup>3</sup>. As other viruses in this virus family, Zika virus is enveloped and icosahedral and has a nonsegmented, single-stranded,

positive-sense RNA genome. There is a possible link between Zika fever and microcephaly in newborn babies by mother-to-child transmission<sup>4, 5</sup>, as well as a stronger one with neurologic conditions in infected adults, including cases of the Guillain-Barré syndrome<sup>6</sup>. Zika is closely related to the Spondweni virus and it is one of the two viruses in the Spondweni virus clade<sup>7, 8</sup>. There are two lineages of Zika virus, the African lineage and the Asian lineage<sup>9</sup>. Phylogenetic studies indicate that the virus spreading in the Americas is most closely related to French Polynesian strains<sup>10</sup>. Complete genome sequences of Zika viruses have been published<sup>11</sup>. Recent preliminary findings from sequences in the public domain uncovered a possible change in non structural protein 1codon usage that may increase the viral replication rate in humans<sup>12</sup>.



### **Modes of Transmission:**

Zika virus is transmitted by a number of species in the genus *Aedes*, such as *A. aegypti*, and arboreal mosquitoes such as *A. africanus*, *A. apicoargenteus*, *A. furcifer*, *A. hensilli*, *A. luteocephalus*, and *A. vitattus* which are daytime-active mosquitoes. According to the studies extrinsic incubation period in mosquitoes is about 10 days<sup>13</sup>. Zika virus can migrate between humans through sexual contact and it can also cross the placenta and affect an unborn fetus. Across all continents including North America and even the European periphery *A. aegypti* distribution is now the most extensive ever recorded. Perinatal, in utero, and possible sexual and transfusion transmission events have also been reported. In 2015, Zika virus RNA was detected in the amniotic fluid of two fetuses, indicating that it had crossed the placenta and could cause a mother-to-child infection.

### **Through mosquito bites:**

Zika virus is transmitted to people primarily through the bite of an infected *Aedes* species mosquito. These are the mosquitoes that also spreads dengue and chikungunya viruses. Mosquitoes become infected when they feed on a person already infected with the virus. Infected mosquitoes can then spread the virus to other people through bites. These are the day-time active mosquitoes and prefer to bite people and live near people indoors and outdoors.

### **From mother to child:**

<sup>25</sup> There is little information on this mode of transmission that is being investigated. Perinatal transmission has been reported with other vector-borne viruses, such as dengue and chikungunya.

### **Through infected blood or sexual contact:**

Through blood transfusion and

sexual contact spread of the virus have been reported. Though it is an infrequent mechanism Zika can be transmitted through blood. The usual recommendations for safe transfusions should be followed (e.g., healthy volunteer donors).

### **Symptoms:**

<sup>14</sup> The most common symptoms of Zika virus are acute onset of fever with cutaneous maculopapular rash, arthralgia notably of small joints of hands and feet, with possible swollen joints, conjunctivitis. Other commonly reported symptoms include myalgia, headache, retro-ocular headaches and post-infection asthenia which seems to be frequent. The incubation period for Zika virus disease is few days to a week and illness is usually mild with symptoms lasting for several days to a week. Deaths are rare and severe disease requiring hospitalization is uncommon. However, there have been cases of Guillain-Barre syndrome reported in patients following suspected Zika virus infection. The possible association between Zika virus and a reported increase in the number of babies born with microcephaly is also being investigated. Due to concerns of microcephaly associated with maternal Zika virus infection, fetuses and infants of women infected with Zika virus during pregnancy should be evaluated for possible congenital infection and neurologic abnormalities.

Most of the symptoms are similar to those of dengue or chikungunya, which are transmitted by the same type of mosquito. Neurological and autoimmune complications are infrequent.

### **Diagnosis:**

There are no commercially available diagnostic tests for Zika virus disease. Diagnosis of Zika will first and foremost based on symptoms, travel



history and exclusion of more serious diseases including measles, rubella and dengue. Zika virus testing is performed at few state health departments, state and federal labs and also in CDC Arbovirus Diagnostic Laboratory. Blood tests can help to confirm the diagnosis. Some (virological PCR tests) are useful in the first 3-5 days after the onset of symptoms, while others (serological tests) detect the presence of antibodies but are useful only after five days.

Zika virus disease can often be diagnosed by performing reverse transcriptase-polymerase chain reaction

**Preventive Measures:**

(RT-PCR) on serum during the first week after onset of symptoms, Virus-specific IgM, IgG and neutralizing antibodies typically develop toward the end of the first week of illness; cross-reaction with related flaviviruses (e.g., dengue and yellow fever viruses) is common and may be difficult to discern.

Plaque-reduction neutralization testing can be performed to measure virus-specific neutralizing antibodies and discriminate between cross-reacting antibodies in primary flavivirus infections.

**TABLE 1: PREVENTIVE MEASURES TO BE TAKEN FOR VARIOUS CAUSES OF ZIKA VIRUS INFECTION**

Cause of infection	Preventive measures
Mosquito bites	Use of insect repellent containing active ingredient like DEET, PICARDIN, IR3535, bayrepel, oil of lemon eucalyptus, Para-menthane-diol etc
	Wearing protective clothes Eg: Long sleeved shirts and long pants, permethrin treated clothes
	Screening windows and doors.
	Eliminating standing water in and around home.
	Control or remove mosquito larval habitats.
From mother to child	Delay travelling to Zika infected places
	Follow steps to prevent mosquito bites.
	Regular monitoring and testing by healthcare providers
Through infected blood or sexual contact	Prior monitoring of donor's blood samples to performed.
	Avoid sexual contact during pregnancy
	Use preventive barriers like condoms at every time of sex.
Travelling to infected places	Postpone travelling to zika infected areas. Follow travel health notices for information about
	Zika infected areas.
	Cover exposed skin when possible.

Stay in air-conditioned places and use mosquito control nets while sleeping.



## Measures to be taken by various departments for control and prevention of Zika virus:

### Role of Federal Government:

- Working with international and state health departments to
- Alert health care providers and public about Zika.
- Provide state health laboratories with diagnostic tests and treatment methodologies.
- Support mosquito control programs around the world.
- Investigating possible association between zika virus and micropcephaly, Guillain-Barre syndrome.

### Role of state and public health agencies:

- Work with CDC's Arbovirus Diagnostic laboratory and health departments to test for zika virus when indicated.
- Report laboratory-confirmed cases to national surveillance system for arboviral diseases.
- Activate and enhance mosquito surveillance and control activities.

### Role of health care providers:

- Must be trained about the symptoms and preventive measures of zika.
- Contact state and local health department to facilitate diagnostic laboratory testing.

For pregnant women ultrasound findings of microcephaly, intracranial calcifications and amniocentesis are to be performed.

- Manage symptoms in infants with congenital zika virus infection and monitor the child's development over time.

**Treatment:**<sup>46</sup> No specific antiviral vaccine or medication is reported to prevent or treat Zika infections. However the symptoms can be relieved by using

analgesics, antipyretics and other NSAIDS. Aspirin and other NSAIDS can be used only after complete treatment of dengue such that risk of hemorrhage can be ruled out.

### Future Scope:

Competent vaccines endure for several Flaviviruses diseases like dengue fever, yellow fever virus, Japanese encephalitis and tick-borne encephalitis. Though there is no specific treatment or vaccine currently available for zika virus. However an Indian company named Bharat biotech has claimed patents on two zika virus vaccines based on recombinant genetic engineering technique and inactivated virus immune response. The two vaccines are ready for pre-clinical trials and were to be further examined scientifically by ICMR. The National Institute of Allergy and Infectious diseases in US also started working on the zika virus vaccine.

### CONCLUSION:

The outburst of Zika virus and its related issues in pregnant women and new born children is an alarming situation. The statement "Prevention is better than Cure" is apt for the current scenario of the disease. All the available preventive measures for the possible causes of infection, mainly mosquito bites, are to be implied strictly by the Federal Government, Public health agencies, health care providers and individual people, such that the prevalence of disease can be reduced. The present clinical trials and attempts to develop a combatant vaccine for the treatment of zika virus will come into light and yield fruitful results in the nearby future.

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