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## REVIEW ARTICLE

### RAPID SPREADING OF ZIKA VIRUS: THE CHALLENGE FOR HUMAN HEALTH.

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#### Abstract

Today's world is constantly challenged by many diseases, which are characterized by many bacterial, viral or other microorganisms. However, many protective agents being already developed to inhibit and kill these microorganisms for complete cure. But nowadays there is a virus named Zika *Flavivirus* transmitted by *Aedes* mosquitoes, which has made a challenge to the scientists who are working in the field of Virology. The Pan American Health Organization (PAHO) issued an alert reflecting the confirmation of the first Zika virus (ZIKV) infection in Brazil. Nowadays, the spreading of this emerging Zika virus is ongoing globally and making a body of challenge for the universe. In this review, we discussed the current understanding of its transmission, epidemiology and clinical aspects regarding to the diseases caused by Zika virus.

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#### Introduction

Zika virus (ZIKV) is an emerging single stranded RNA *Flavivirus* belonging to the family of *Flaviviridae* and genus *Flavivirus*, same as the dengue virus<sup>[8]</sup>. The *Flavivirus* covers so many viral species such as yellow fever, dengue, Saint Louis encephalitis and West Nile viruses etc<sup>[17]</sup>. The Zika virus is spread by *Aedes* mosquito mainly *Aedes aegypti* and *Aedes albopictus* particularly in the day time because this virus is very much active in day time<sup>[1,2,3,5]</sup>. This virus is enveloped, icosahedral and has a non-segmented single stranded positive RNA genome<sup>[8]</sup>. So it can directly be translated into viral proteins<sup>[8]</sup>. The infection shown as Zika fever, these are dengue, yellow fever, Guillian-Barre syndrome and Japanese encephalitis etc<sup>[2]</sup>.

#### Epidemiology

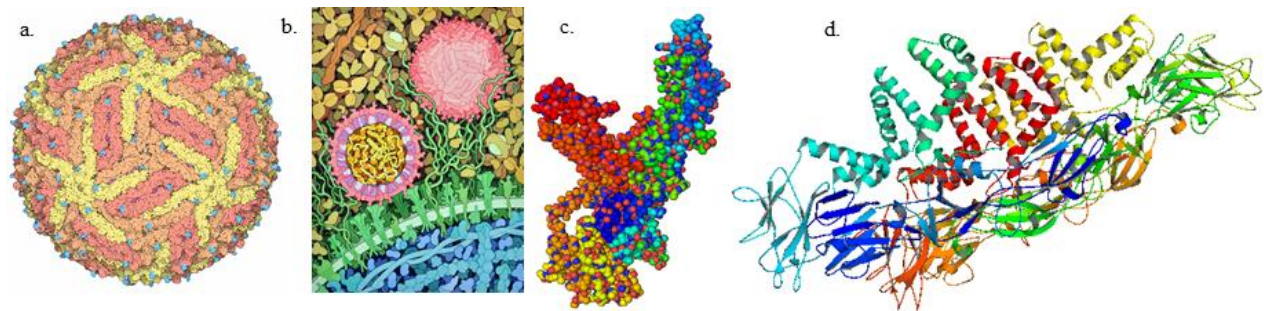
Zika virus was first isolated from the serum of rhesus monkey in 1947 from the Zika forest of Uganda<sup>[1,2,6]</sup>; simultaneously it has been spread to different places in the world. It was first identified in human in 1952 in Uganda and Tanzania<sup>[1]</sup>. There were several cases issued throughout the decade.

Investigations have been revealed that Brazil, some part of Mexico and Caribbean Iceland's severely affected by this virus<sup>[1]</sup>. Zika virus also spread to some other places like North America, French Polynesia, Africa and some parts of South Asia<sup>[1]</sup>. In 2015 in Brazil there were near about 2500 patients found who were severely affected by this virus<sup>[5]</sup>. Though there are not enough cases found in Asia like Brazil, but scientists even think that this virus has taken place in those areas<sup>[5]</sup>. The World Health Organization (WHO), Pan American Health Organization (PAHO) and other agencies has been already issued notice about Zika virus and associated disorders, worldwide.

#### Studying the Zika virus

In the recent years the studies of Zika virus has gained the heights because of its emerging personality and its association with various neurological and the other rare diseases globally.

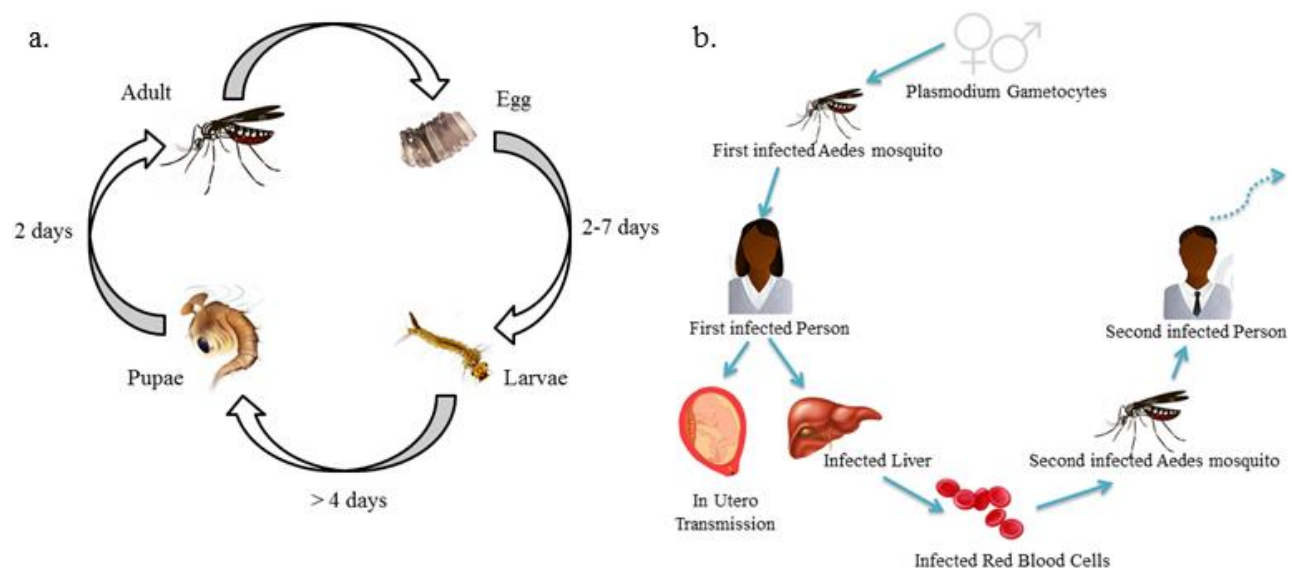
So, the various aspects of advance sciences have been used to investigate the ZIKV. Currently the atomic structure of Zika virus has been revealed by the use of Cryo-electron microscopy<sup>[18]</sup>. The structural information for ZIKV through such advance and helpful technology would give up some fruitful outcomes over disease control in order to modernize the basic medicinal field for human welfare and development of biological research.



**Figure 1:** *a. The Cryo-EM structure of Zika Virus<sup>[18]</sup>: Molecule of the month- May, 2016, PDB (Yellow and Red: envelope proteins with glycosylation in turquoise, Magenta: membrane protein), b. ZIKV in cross section (center left) with envelope and membrane protein attached to a lipid membrane (light purple), Association of RNA genome (Yellow) with capsid proteins (Orange), the interaction of viruses with cell surface receptors (Green) and they are surrounded by blood plasma at the top<sup>[18]</sup>. c. Dot representation of envelope and membrane proteins of ZIKV. d. Cartoon representation of Zika virus.* [Source: Protein Data Bank]

### Transmission of Zika virus

There are mainly two ways of transmission of Zika virus, the first is mosquito-borne transmission and another one is non-mosquito transmission<sup>[16]</sup>. In mosquito-borne transmission the Zika virus is transmitted to the human body through the bite of mosquitoes. *Aedes* genus mainly the female one requires blood in order to lay eggs hence these mosquitoes feed on blood<sup>[9]</sup>. Primarily the ultimate host of the virus was monkey so its life cycle called as enzootic mosquito-monkey-mosquito cycle<sup>[8]</sup>.



**Figure 2:** *a. Life cycle of Aedes mosquito; b. Zika virus transmission cycle.*

The virus is also transmitted through sexual contacts because this virus is capable to grow in serum of man for at least 2 to 10 weeks<sup>[5,10,11]</sup>. There are several reports in the United States, which confirms that unprotected sexual intercourse also transmits this virus to a normal healthy individual<sup>[11,12]</sup>. If a person is infected with the Zika virus he should avoid sexual contact with his partner because this virus is much more sensitive in sexual transmission<sup>[8]</sup>. There is also a strong possibility that the Zika virus can be spread through blood transfusions<sup>[19]</sup>. Studies also



There is no vaccine, specific drug or any other prevention strategies for the treatment of Zika virus infection. However, for the relief, the patient should get plenty of bed rest and the use of liquids and fluids with medicine is recommended to relieve pain and fever.

## Discussion

The Zika virus has shown different changes with the change in different places in the world. The endemic change with mosquito infection caused many diseases like microcephaly, neurological disorders, Japanese encephalitis etc. In the future the virus infection can be spread through the increasing population of the *Aedes* genus mosquitos. The virus also transmitted person to person through physical contacts. This virus is much more challenged than any other virus like Ebola. This virus mainly affects the unborn, newborn and children with an age of 3 to 9 years. There is no medicine or therapeutic agents for killing or inhibiting the virus for complete cure. Perhaps the biggest challenge for human being with Zika to recognized it with different kind of diseases and applies proper medication. So there is an urgent need to effectively design of strategies and approaches to address these issues for the prevention and/or treatment of the Zika virus transmission and infection.

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