

# Past, Present and Future Scenario of Zika Fever and Associated Neurological Defects in Pregnant Women

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## 1. Abstract

Zika fever is a tropical viral infection which prevailed in African and Asian countries. The vector for Zika Fever is Aedes, which also transmits the fever of dengue and chikungunya. India is vulnerable to Zika virus outbreak as the species of mosquito, Aedes aegypti, which carries the virus, is found across the country. Aedes mosquito too carries the viruses of Dengue and Chikungunya. The Zika virus (ZIKV) is a positive-sense, single-stranded RNA virus belonging to the genus Flavivirus within the family Flaviviridae. It has rapidly focused global attention due to its association with clusters of congenital malformations such as neurological disorders and fetal danger in the development of microcephaly. The incidence of Guillain-Barre (GB) syndrome is also observed during the current Zika virus outbreak. In every pregnancy a woman starts out with a 3-5% chance of having a baby with a birth defect. As per a World Health Organisation (WHO) report, Zika is now present in 23 countries and Brazil being the hardest-hit country, has reported around 3,530 cases of the devastating birth defect, called microcephaly in 2015, that are strongly suspected to be related to Zika. WHO has declared the Zika Virus as epidemic as a global public health emergency on 1 February 2016.

Reports suggest that there is no vaccine or drug available to prevent or treat Zika virus disease at present. The proposed research work aims to develop novel herbal formulation carrying high antiviral property against prevailing zika fever and associated viral infection and other symptoms.

World Health Organization is very concerned about the explosive spread of Zika virus because Zika is associated with neurological complications, including brain damage in infants. The current outbreak of Zika is not only health devastating but is also great threat to nation's economy. Estimated loss in Latin America and Caribbean is US\$3.5 billion. The world will keep on facing new challenges in the form of Ebola or Zika; there is strong need to prepare ourselves for any disease outbreak.

## 2. Background

Zika virus (ZIKV) was originally identified in a sentinel rhesus monkey in the Zika Forest of Uganda in 1947. The virus is a member of the family Flaviviridae, genus Flavivirus. Zika virus was initially discovered in east Africa about 70 years ago and remained a neglected arboviral disease in Africa and Southeast Asia. First documented outbreak of ZIKV outbreak on Yap Island, Micronesia, in 2007, after that in 2013, a Zika outbreak in French Polynesia caused 42 cases of Guillain-Barre syndrome, a condition that can cause severe paralysis in victims. In May 2015, it was found in northeast Brazil. More than 20 countries have

reported cases of Zika infection. The condition of ZIKV infection is named "dengue-like syndrome" because it resembles an infection caused by the DENV. Zika fever is a tropical infection prevailed in African and Asian countries. The presence of this arbovirus has become an important public health concern globally [1-3].

## 3. Zika Virus Affecting Mother and Child

In every pregnancy a woman starts out with a 3-5% chance of having a baby with a birth defect. This is called her background risk. Globally, annual GBS incidence is estimated at 1.1 to

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1.8/100,000/year, of which approximately 70% appear associated with antecedent infectious disease. Exposure to the Zika virus may increase the risk for birth defects over that background risk. If a pregnant woman is infected with the Zika virus, there is a chance that the virus will cross the placenta and affect the growth and development of the pregnancy. Specifically, Zika virus infection during pregnancy can cause microcephaly (small head and brain) and other severe brain defects. Other abnormalities that have also been associated with Zika virus infection during pregnancy include miscarriage, eye defects, hearing loss and impaired growth. In rare cases, people who have been infected with Zika virus have a small increased risk for developing another condition called Guillain-Barré syndrome (GBS). GBS is a condition that affects a person's nervous system which leads to weakness in the arms and legs, in severe cases GBS can cause a person to reach in a condition of paralysis. While uncommon, GBS can sometimes affect the muscles that control breathing. Symptoms of GBS can last a few weeks to several months. Most people who develop GBS completely recover, but there are some who have permanent nerve damage. While unlikely, there are a few cases where people have died from complications of GBS. For pregnant women who have Zika, it is currently unknown what the chance of a pregnancy developing birth defects is? Hence, globally many researches on the effects of Zika virus infection during pregnancy is ongoing. Retrospective seroneutralization analysis of GBS cases which were suspected of being associated with Zika during the 2013–2014 outbreak in French Polynesia has demonstrated that all 42 cases were positive for both dengue and Zika virus infection, yielding a ratio of 1 case of Zika-associated GBS for every 208 suspect cases of Zika virus infection [4-6].

#### 4. Zika and other Pregnancy Problems

In addition to microcephaly, other problems have been detected among fetuses and infants infected with Zika virus before birth, such as eye defects, hearing loss, and impaired growth. Although Zika virus is a cause of microcephaly and other severe fetal brain defects and has been linked with these other problems in infants, there is more to learn. Researchers are collecting data to better understand the extent Zika virus impact on mothers and their children.

##### 4.1. Rationale of Study

- India is vulnerable to Zika virus outbreak as the species of mosquito, *Aedes aegypti*, which carries the virus, is found across the country. It's the same mosquito that carries the viruses of Dengue and Chikungunya.
- India is at Risk of Zika Virus as it is one of the countries which is almost entirely susceptible to the disease, for two reasons. Firstly, because of the climatic conditions are such when

it is hotter, mosquitoes are able to spread diseases easily and reports show that the Zika virus is like a heat-driven missile. Secondly, because of dengue conditions which prevailed in India in every season and also India is one of the countries where *Aedes Aegypti* - mosquitoes that transmit both Dengue and the Zika virus are extremely prevalent.

- For treatment against Zika fever or viral infection antiviral drugs has been advised which also has numerous side effect and such drugs are contraindicated during pregnancy due its adverse effects. Thus the rationale of our study is to develop novel herbal nanoformulation carrying high antiviral property against prevailing zika infection and its associated symptoms during pregnancy [6-8].

##### 4.2. Hypothesis

Hypothesis of our proposed research work is firstly the extraction of new herbal moieties for treatment of Zika fever and related Zika infection. Secondly, we will formulate few nano formulation from extracted novel herbal moiety. Thirdly the proposed research work focuses on the safety and efficacy of the prepared nano herbal formulation [9, 10].

##### 4.3. Outcomes

With the sudden emergence of Zika virus infection as an epidemic we are confronted with the need to simultaneously study and understand a disease which can be lethal in pregnant women and can affect the health of both mother and child. In many ways zika stands as more complex challenge than other viral diseases such as ebola, dengue and thus can impact more lives. Since zika related diseases have its more devastating effects on unborn foetus which are associated with neurological disorder with a delay to diagnosis. Hence there is an urgent need to develop new and safe formulation for the treatment of infection arising at the time of pregnancy.

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