



ZIKA Virus: An Overview

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ABSTRACT Zika virus is a single stranded RNA arbovirus member of the genus flavivirus and is related to other mosquito-borne viruses such as Dengue, Yellow fever, Japanese B encephalitis, West Nile fever and Chikungunya viruses. Zika virus infection is linked to Microcephaly and Guillain-Barre Syndrome (GBS) in newborns, which is a matter of concern. Zika virus is transmitted to people primarily through the bite of an infected Aedes species mosquito. It can be transmitted by blood transfusion but other route like sexual transmission requires more research. Zika virus has recently emerged to become one of the most important viral threats worldwide. The lack of a commercial vaccine and the failure of vector control strategies prompted the need for further options to prevent the spread of this disease. We review the symptoms, transmission, prevention, diagnosis and treatment of current zika virus outbreak, highlight knowledge gaps and the need for public awareness.

KEYWORDS : Zika virus, Symptoms, Transmission, Mosquito borne virus, Prevention

INTRODUCTION

In May 2015, the PAN American Health Organization (PAHO) issued an alert regarding the first confirmed zika virus infection in Brazil¹, and presently the outbreak are occurring across 31 other countries and territories in the world^{2,3}. The outbreak in Brazil led to reports of Guillain-Barre Syndrome (GBS) and pregnant women giving birth to babies with birth defects and poor pregnancy outcomes^{4,5,6,7,8,9}.

Zika was named as such because it was first identified in a rhesus monkey in the zika forest of Uganda in 1947¹⁰. Zika virus was later found in humans with febrile illness in West Africa in 1954¹¹. After that it spread to Indonesia¹², Micronesia¹³, Thailand¹⁴, Philippines¹⁵, French Polynesia¹⁶ and Eastern Island of South Pacific in 2014¹⁷.

Zika virus disease is caused by an RNA virus transmitted to human by Aedes mosquitoes, especially by the Aedes aegypti species. Up to 80% of infections are asymptomatic¹³. Symptomatic infections are characterized by a self-limiting febrile illness of 4 to 7 days duration accompanied by maculopapular rash, arthralgia, conjunctivitis (red eyes), myalgia and headache. Severe disease requiring hospitalization is uncommon. In the past, zika virus has not been noted to cause death, nor has it been linked to intrauterine infections and congenital central nervous system (CNS) anomalies. Zika virus infection was linked to Guillain-Barre Syndrome (GBS) for the first time in 2014 when a possible association between zika virus infection and Guillain-Barre Syndrome (GBS) was reported during an outbreak in French Polynesia¹⁸.

There is no vaccine to prevent zika virus infections nor is any specific anti-viral treatment available. Zika virus infection can be confirmed by direct detection of zika virus RNA or specific viral antigens in clinical specimens. Virus specific antibodies can be detected usually from 5th or 6th day of illness but serological results should be interpreted with caution due to cross reactivity with other flaviviruses such as dengue.

TRANSMISSION

The primary mode of transmission of zika virus between humans is through the bite of an infected female mosquito of the Aedes species^{4,5}. Apart from mosquitoes, other non-vector means of transmission of zika virus have been suggested, such as via sexual intercourse^{19, 20}, blood transfusions²¹, perinatal transmission from mother to fetus at time of delivery^{22,23,24}.

Mosquito-borne Transmission

Zika virus is transmitted to people primarily through the bite of an

infected Aedes species mosquito. The main vector associated with transmission of zika virus is Aedes aegypti. Transmission can also occur via other Aedes species, such as: Aedes albopictus, Aedes africanus, Aedes lateralis, Aedes triseriatus, Aedes albopictus, Aedes hensili and Aedes apicoargenteus²⁵. Aedes species are the same mosquitoes that spread dengue and chikungunya viruses^{26,27, 28,29,30,31}.

These mosquitoes typically lay eggs in places with stagnant water like buckets, bowls animal dishes, flower pots and vases. They bite humans mainly during daytime, either outside or inside their houses. 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.

Perinatal Transmission

A mother already infected with zika virus near the time of delivery can pass on the virus to her newborn around the time of birth²², but this is rare. It is possible that zika virus could be passed from a mother to her baby during pregnancy²³. Up-till now, there are no reports of infants getting zika virus through breastfeeding.

Sexual Transmission

Spread of the virus through sexual contact has been reported and zika virus has been isolated from semen^{19,20}. Studies are required to assess how frequently and for how long zika virus persists in semen.

Through Blood Transfusion

Spread of the virus through blood transfusion has been also reported. Zika virus infection is asymptomatic⁴, so transmission of zika virus via blood transfusion is a matter of concern²¹. Blood donation from people who had visited the affected areas should be screened or discontinued.

SYMPTOMS

About 1 in 5 people infected with zika virus become ill (i.e. develop zika). The incubation period is not known but the first symptoms of zika virus disease can develop between 3 to 12 days after the mosquito bite and they resolve within 7 days in most cases. Zika virus causes predominantly a mild illness and therefore over 80% of cases may go unnoticed⁴.

The most common symptoms of zika are fever, rash, joint pain, or conjunctivitis (red eyes). Other common symptoms include muscle pain and headache. These symptoms are usually mild and last for several days to week. People usually don't get sick enough to get hospitalization and they very rarely die of zika. Zika virus usually

remain in the blood of an infected person for about a week but it can be found longer in some people.

In October 2015, following reports of an unusual increase of cases of microcephaly among newborns in the state of Pernambuco in Brazil, a retrospective analysis of records in the Brazilian live birth information system identified substantial increases in the number of reported cases of microcephaly compared with previous years in several Brazilian states³². On 24 November 2015, the health authorities of French Polynesia reported an increase from an average of one reported case annually to 17 cases of congenital CNS malformations in fetuses and infants during 2014 and 2015. Different CNS malformations were observed in 12 of these cases^{33,34}. The health authorities postulated that zika virus infection during the first two trimesters of pregnancy may be associated with these malformations on the basis of the temporal association between the two events³⁵. Between 22 October 2015 and 30 January 2016, Brazilian authorities received 4,783 notifications of microcephaly or central nervous system anomalies³⁶.

MICROCEPHALY

Microcephaly is a birth defect where a baby's head is smaller than expected when compared to babies of the same sex and age. Babies with microcephaly often have smaller brains that might not have developed properly.

During pregnancy, a baby's head grows because the baby's brain grows. Microcephaly can occur because a baby's brain has not developed properly during pregnancy or has stopped growing after birth, which result in a smaller head size.

Microcephaly can be an isolated condition, meaning that it can occur with no other major birth defects, or it can occur in combination with other major birth defects.

Severe microcephaly is a more serious, extreme form of this condition where a baby's head is much smaller than expected. Severe microcephaly can result because a baby's brain has not developed properly during pregnancy, or the brain started to develop correctly and then was damaged at some point during pregnancy.

Microcephaly has been linked with the following problems like, seizures; developmental delay, such as problem with speech or other developmental milestones (like sitting, standing and walking); intellectual disability (decreased ability to learn and function in daily life); problem with movement and balance; feeding problem such as difficulty in swallowing, hearing loss, vision problems.

GUILLAIN-BARRE SYNDROME

The syndrome is named after the French neurologists Georges Guillain and Jean Alexandre Barre, who described it with Andre Strohl in 1916. Guillain-Barre Syndrome is an uncommon sickness of the nervous system in which a person's own immune system damages the nerve cells, causing muscle weakness, and sometimes, paralysis. Guillain-Barre syndrome symptoms include weakness of the arms and legs that is usually the same on both sides of the body. In some cases, the muscles of the face that control eye movement or swallowing may also become weak. In the most serious cases, this muscle weakness can affect breathing, and people sometimes need a breathing tube to help them breathe.

PREVENTION

There is no vaccine available to prevent zika virus disease. Prevent zika by avoiding mosquito bites. Aedes mosquitoes bite during the daytime both indoors and outdoors. Therefore personal protection measures should be applied during the day. Use appropriate mosquito repellents and wear long sleeved shirts and long trousers especially during the hours of highest mosquito activity. Sleeping in air-conditioned rooms or using insecticidal treated mosquito nets, even during the day. Remove mosquito breeding sites from outdoor/indoor premises. Similar protective measures apply to symptomatic patients in order to prevent transmitting the disease to non-infected mosquitoes. During the first week of infection, zika virus can be found in the blood and passed from an infected person to another mosquito through mosquito bites (blood meal). An infected mosquito can then spread the virus to other people.

DIAGNOSIS

The diagnosis of zika virus can be confirmed by amplification (RT-

PCR) of viral genome³⁷. The clinical utility of RT-PCR is limited to testing blood samples collected less than one week after onset of symptoms. Zika virus RNA has been detected in urine up to 10 days after onset of the disease. RT-PCR can also be performed on amniotic fluid.

Virus-specific IgM and neutralizing antibodies typically develop towards the end of the first week of illness, so zika-specific IgM antibodies can be detected after 5 days post onset of disease. The viremia period appears to be short, allowing for direct virus detection during the first 3-5 days after the onset of symptoms.

TREATMENT

There is no specific medicine to treat zika infection. Zika virus disease is usually relatively mild and requires no specific treatment. People sick with zika virus should get plenty of rest, drink enough fluids to prevent dehydration and take medicine to relieve fever and pain. If symptoms worsen, they should seek medical care and advice.

CONCLUSION

World Health Organization (WHO) declared Zikavirus a 'Global Emergency'. There are several unknown facts about the pathogenesis, transmission and treatment of zika virus, physicians should guide patients regarding prevention of the disease. Particular care should be taken for pregnant women. The disease is asymptomatic in a majority of the cases. Affected patients should be kept under close observation. They should be counsel about the use of condoms and the risk of blood donations. In the absence of a zika virus vaccine, control efforts so far rests entirely on mosquito vector control and prevention of mosquito bites. Strategies for preventing spread by blood transfusions, via sexual contact, other tissue and organ transplantation are also required. Proper preventive methods will break the chain of transmission. The development and availability of specific and rapid diagnostic tests for zika virus will allow enhanced surveillance and assessing level of risk for microcephaly, Guillain-Barre syndrome and other complications. Fast developing international traffic and booming tourism as well as the vector spreading infection make zika a real threat to our country.

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