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Noura Taybeh
Butler University

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Examining Zika Virus: Transmission, Diagnosis, Treatment, and Prevention

Noura Taybeh

Abstract: The Zika virus is a mosquito-borne virus that was first isolated in Uganda in 1947 and has since caused outbreaks in many parts of the world. It has multiple routes of transmission and may cause acute illness and death if not treated. The Zika virus becomes a major concern if transmitted from mother to fetus as it increases the chance of birth defects and developmental problems to the unborn baby. This article highlights the importance of early diagnosis and describes Zika virus' transmission, treatment, and prevention.

Zika virus is a viral infection that is carried by infected *Aedes aegypti* mosquitoes and transmitted through bites. The virus was discovered in 1947 in Uganda in monkeys and then was identified in humans in 1954.¹ *Aedes aegypti* is also known to transmit yellow fever, West Nile virus, and Japanese encephalitis.² The Zika virus is still circulating in many parts of the world with documented outbreaks affecting regions such as Mexico, Central America, South America, and the Caribbean. The virus' incubation period is estimated between 2-14 days. While most people do not develop symptoms, they can last between 2-7 days and consist of fever, muscle and joint pain, headache, swollen lymph glands, malaise, and rash. Less common symptoms are edema, vomiting, and abdominal pain.³ Currently, there is no vaccination to prevent or anti-viral medication to treat the Zika virus. The best protection against Zika is preventing mosquito bites and avoiding areas with the virus. The disease continues to be a public health concern, especially for unborn children with infected mothers. Transmission, diagnosis, and treatment of the Zika virus is still a main concern, as it can cause extensive illnesses and even death.

The Zika virus has multiple modes of transmission including mosquito bites, sexual transmission, blood transfusion, and mother-to-child transmission. Sexual transmission, otherwise known as non-vectorial transmission, occurs when an infected person passes the virus through intercourse with his or her partner.⁴ Although the reported cases of transmission through blood transfusion are low, a study in Brazil showed that some blood donors were infected and asymptomatic at the time of donation. However, post-donation surveillance showed that the infected donors started to experience symptoms shortly after blood donation. This method of transmission occurred during the French Polynesian outbreak in 2013, when 2.8% of blood donors tested positive for Zika virus. The Zika virus has been detected in breast milk, but it is unclear whether the virus is transmissible to children via breastfeeding.⁵ A study published by the Infectious Diseases Society of America in 2018 found that mother-to-child transmission of the virus can occur during breastfeeding, during delivery and close contact between mother and child.⁶ If the virus is passed to the fetus during pregnancy, the developing fetus has an increased chance of birth defects and developmental problems. Developmental problems may include hearing loss, decreased brain tissue with brain damage, eye defects, seizures, problems with joint and limb movement, and microcephaly; a condition where the head is significantly smaller than normal.⁷ One severe complication is Guillain-Barre syndrome (GBS). GBS is a rare neurological disorder where the immune system attacks the peripheral nervous system. GBS symptoms present with weakness

in muscles including fatigue, dysphagia, and may result in paralysis.⁸

Zika virus can be diagnosed using two different tests, one detecting antibodies and the other identifies the genetic footprint of the virus. The genetic test, known as RNA nucleic acid amplification test (NAAT). This test identifies the infection by confirming the presence of the virus' genetic material RNA. In contrast, the tracing of the virus antibodies known as immunoglobulin antibody test (IgM). The IgM antibodies are detectable 1-12 weeks post exposure. The NAAT test is more specific in detecting the virus but is less sensitive and could give false-negative results, while the IgM antibodies test is more sensitive but less specific, meaning it could detect similar viruses instead of just the Zika virus. The two tests can be performed concurrently for increased reliability in diagnosing infection.⁹

Prevention and treatment of symptoms are key. Avoid mosquito bites by using mosquito repellents and wear protective clothing. Zika may be prevented by avoiding travel to Zika-endemic areas. In particular, pregnant women in any trimester or women trying to become pregnant should avoid these areas. The typical recommendations for virally infected patients are to drink plenty of fluids to prevent dehydration, rest to help the body combat the infection, and pain relief medication to help with fever and pain. Currently, there is no specific antiviral treatment for the Zika disease. The National Institute of Health (NIH) began testing a Zika virus vaccine in 2016. The DNA-based Zika vaccine that entered phase two of clinical trials could prevent microcephaly and other congenital defects caused by the Zika virus.¹⁰

The Zika virus remains a public health concern. The Zika virus is transmitted through various means such as mosquito bites, sexual transmission, mother-to-child, and blood transfusion. At this time, taking precautions is the primary way to protect against the Zika virus transmission. The future may show promise for development of vaccinations or potential treatment for the Zika virus.

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