

Zika Virus: An Emerging Infection

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ABSTRACT

Zika Virus (ZIKV) having its name originated from Zika forest belongs to the family of Flaviviridae, which is a clinical classifying group of Arboviruses. In 1952 the first human case was being reported and since then, more cases have been reported specifically in the African-Asian equatorial belt. Zika virus spread around the globe makes it an alarming concern, thus it has been declared by WHO as a state of 'international emergency'. The Infected *Aedes aegypti* species mosquito is a vector of transmission in the African region, while *Aedes albopictus* is a vector of transmission in the Asian region. Zika Virus is transmitted through blood and lymphatics, saliva, semen, and more importantly transmitted from an infected mother to an infant, during anytime of pregnancy. No anti-viral treatment exists for ZIKV so as no vaccination is present for ZIKV. The best preventive measure is to create a barrier for viral transmission. Moreover, public awareness carries great importance in preventing infection of Zika Virus.

Keywords: Arboviruses, *Aedes aegypti*, *Aedes aegypti*, Zika Virus

SHORT COMMUNICATION

Zika Virus (ZIKV) belongs to the family of Flaviviridae, which is a clinical classifying group of Arboviruses.¹ ZIKV name originated from the Zika forest, situated in Uganda along the Lake Victoria and was first isolated in the serum of a pyrexial rhesus monkey of the Zika forest in the year 1947.¹ Five years later, in 1952 the first human case was being reported. Since then, more cases have been reported with the rising prevalence specifically in the African-Asian equatorial belt.² Cases have been reported from Nigeria, Sierra Leone, Gabon, Uganda, Central African Republic and Cote d'Ivoire within Africa. The outbreak of ZIKV in Yap island in the year 2007 marked its significance as it disseminated to different regions.³ In year 2013 and 2014, ZIKV has been a serious threat to Pacific Island nations as a large number of reports have been documented during this period.⁴ In 2016, Latin America and Brazil have been a significant target. In Asia cases have been identified from Indonesia, Malaysia, and Pakistan. This spread of Zika virus around the globe makes it an alarming concern for all international health governing bodies, as it has been declared by WHO as a state of 'international emergency', in February 2016⁵.

Zika Virus (ZIKV) is a type of Arbovirus and showed structural similarity with the Dengue Virus and the West-Nile virus, which are also types of Arbovirus.⁶ It is a single stranded RNA virus, consisting of 10800 nucleotides and exhibits an

icosahedral symmetry. Apart from structural similarity, ZIKV had a similar mode of transmission as that of Dengue virus. The Infected *Aedes aegypti* species mosquito is a mutual /common vector of transmission.⁶ The species is a predominant inhabitant in the Zika forest and in the rest of African region. *Aedes albopictus*, another mosquito species is also a causative agent of ZIKV and is predominant in the Asian region.⁷ Moreover, Polymerase Chain Reaction (PCR) technique has also confirmed the ZIKV mosquito borne transmission in species of genus *Mansonia uniformis*, *Anopheles coustani* and *Culex perfuscus*.

Zika Virus (ZIKV) has multiple modes of transmission⁸ Once ZIKV being transmitted and entered the body it disseminate through blood and lymphatics after replication in the dendritic cells. It can be transmitted sexually through semen; saliva being another medium of transmission i.e. in animal bites as was reported in monkey bites and through blood transmission. More evidence is required to investigate the invisible routes, such as transmission via lactation and contact with other body fluids i.e. urine. In few case studies ZIKV has also been reported to be transmitted from an infected mother to an infant, during anytime of pregnancy.⁹ ZIKV is teratogenic in nature and like Rubella and Cytomegalo virus (CMV) causes congenital birth defects i.e. microcephaly and fetal brain abnormalities being serious manifestations among infected neonate and fetus. The diagnosis of ZIKV is confirmed by detecting the ZIKV via Elisa or the RT-PCR technique and through urine and nasopharyngeal swab analysis. The duration of this

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viral disease is about 5 to 7 days depending upon the incubation period of the virus.

Individual infected with Zika virus exhibits serious acute medical condition the Guillain-Barre syndrome (GBS) which is characterized with neurologic complications i.e., encephalitis, meningoencephalitis, paresthesias, facial paralysis and myelitis.¹⁰ In few cases GBS eventually leads to death. However, case fatality is low in cases of mild infection. Though it is typically an asymptomatic infection but about 20 % is symptomatic with fever, headache, joint pain, maculopapular rash, malaise, conjunctivitis, arthralgia, myalgia, lymphadenopathy and fatigue being the common clinical patient presentations of the ZIKV infection¹⁰.

Zika Virus (ZIKV) being a self-limiting disease, its management requires supportive measures to be adopted in cases with symptomatic disease.¹¹ This includes rest, proper hydration in the form of intravenous (IV) fluids, analgesics and antipyretics to reduce the symptoms. Aspirin and other NSAIDS (Non Steroidal Anti-inflammatory Drugs) should be avoided to reduce the risk of hemorrhage and Reye Syndrome (predominantly amongst children) amongst cases misdiagnosed and the infection is from Dengue virus. Amongst patients with serious neurological complications i.e. GBS immediate hospitalisation is required. Importantly, intensive care is required where patient's exhibits sign of tachycardia, hypotension, renal dysfunction and (or) coagulopathies.¹¹ In cases where pregnant women are suspected to have transmitted the ZIKV during pregnancy, sonography is recommended to monitor the growth of the fetus and thus infant microcephaly complications can be avoided¹².

No anti-viral treatment exists for ZIKV. Moreover, no vaccination is present for ZIKV thus preventing the infection challenging. However, different research groups are working on the development of ZIKV vaccination. Considering, there is a lack of target treatment available for ZIKV, the best strategy to adopt for its eradication is to create a barrier for viral transmission¹³⁻¹⁴. This includes endorsing protective measures at an individual level from mosquito bites. The use of mosquito repellent and nets, wearing properly covered clothes, i.e. full sleeves and full length pants should be adopted. Moreover, water pooling and spraying should be prevented in larval breeding places in order to control the vector population. All these measures are similar to the prevention of malaria and dengue.¹³⁻¹⁴ Additionally, care should be taken in sexual relations to prevent transmission via semen which can be done by the use of contraceptives. Importantly, proper screening of blood should be done before

blood transfusions thereby ensuring that the donor blood is not infected by Zika Virus¹³⁻¹⁴.

To better implement the preventive measures, it is of much importance to understand that females of reproductive age carried more significance as the infection not only affects the pregnant mother but also places her child at risk¹⁵. Thereby, to prevent vertical transmission from mother to fetus, 19 countries have been warned to delay their local pregnancy plans and declared inappropriate for pregnant women to travel to countries where cases of Zika virus has been reported. Moreover, not only avoidance of travelling to endemic areas is a strategy but also monitoring immigration ports has to be taken as a public health measure to check the influx of infected people. It will be appropriate at airports and other immigration routes travelers should be inspected for ZIKV. It has been reported that in China, strict control measures have been taken which has resulted in blocking local transmission from the infected Taipei to Taiwan¹⁶.

Public awareness carries great importance in preventing infection of Zika Virus. The population and masses should be educated. Health Government agencies and Non Governmental Organisations (NGO) should work on awareness programs to execute the implementation of these strategies by addressing to the concerns of the public and erasing socio-religious taboos attached to preventive techniques, e.g. the use of contraceptives. These departments of health regulations, should be properly funded and an official health policy regarding ZIKV should be declared at national level to prevent from future cases being occurring.

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