



Zika virus: A Public Health Emergency?

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Abstract

Zika virus was first isolated from African zika forest from monkey. It belongs to genus flavivirus. It is a vector borne disease mainly spread by aedes mosquitoes. Previously, it had sporadic outbreaks but due to its spread to new geographical areas, urbanization, it is now an emerging infectious epidemic disease. It is characterized by influenza-like illness but severe manifestations like microcephaly in babies born to infected mothers have been reported. It has horizontal as well as vertical transmission. Reports of virus spread through blood transfusion, asymptomatic sexual partners and intra uterine transmission have been reported. No treatment or a vaccine is have been found for *Zika virus*. Hence primarily focus is on preventing infection particularly in vulnerable pregnant women.

Keywords: *Zika virus*; Monkey; Aedes Mosquito; Microcephaly; Epidemic; Urbanization

Etiology

The genome of *Zika virus* is composed of single stranded RNA and it belongs to genus flavivirus, family Flaviviridae. It is named after Zika forest in East Africa where it was first isolated from a monkey. The first human infection of this virus was found in Nigeria followed by Uganda. It had sporadic or silent transmission to human beings previously but it gained importance with major epidemic outbreaks. The genetic and epidemiological relationship with dengue virus and urban growth gave ideal environmental and ecological conditions for aedes mosquito population and genetic change in *Zika virus* (new viral strains) lead to the evolution of *Zika virus* infections with high epidemic potential and pathogenicity [3].

Transmission

- **Vector transmission:** Tropical and subtropical areas of the world have a high infestation of *Aedes aegypti*, *Aedes albopictus* and a variety of other aedes mosquitoes which are main vectors of *Zika virus* [2]. Vertical transmission of the zika has been found in *Aedes aegypti* mosquitoes.

- **Vertical transmission:** Sexual transmission of virus through genital, oral and anal intercourse have been described in both males and females. *Zika virus* has been detected for up to six months after its onset in semen and up to thirteen days in female genital tract which does not necessarily means that virulent phase of virus is present [1].
- **Transmission through blood:** *Zika viruses* are also reported to be transmitted by blood transfusion [4]. Most infections are asymptomatic and effective strategies to prevent transfusion-transmitted infection are required.
- **Intra uterine transmission:** Viral RNA has been detected in the amniotic cavity of pregnant women with *Zika virus* infection. They can cause fetal abnormalities and may lead to miscarriages.

Pathogenesis

After mosquito inoculation, virus enters the skin cells through cellular receptors. Several adhesion factors (AXL receptor tyrosine kinase) facilitate entry, followed by virus replication in skin

fibroblast. It migrates to the lymph nodes and then bloodstream. *Zika virus* also cross placental barriers, they usually infects human embryonic progenitor cells. The virus seems to mainly target developing brain cells and in some cases adult brain. Early infection can cause retardation of cell growth and cell death. Studies suggest strong neurotropism associated with virus. An increase in centrosomes in mice, results in microcephaly [5]. It is due to virus targets the autophagy during viral replication. These centrosomes play an important role in development of brain. In adults with developed brain, meningitis is a sequel.

Clinical signs

The incubation period of this disease ranges from 3–12 days approximately. All ages are susceptible with higher incidence in females. Symptoms include fever, fatigue, conjunctivitis and rash. Rash is a prominent feature which begins proximally and spreads to extremities within 1-4 days of onset. It is maculopapular and pruritic in most cases. Low grade Fever is typical. Symptoms resolve within 2 weeks and in rare cases persists for longer time. They also cross placental barrier and cause microcephaly in babies born to infected mothers and meningitis in adult.

Diagnosis

Because of clinical overlap with dengue virus, yellow fever and west Nile virus. The diagnosis relies on laboratory testing. RT-PCR of serum samples is the most reliable technique for diagnosis of virus. This methodology for *Zika virus* gives excellent results during its acute phase. RT-PCR testing of urine samples may be considered when the virus is clinically suspected, despite being negative in serum testing.

Conclusion

Among the family of flavivirus, the *Zika virus* gained importance for major epidemic outbreaks. The genetic and epidemiological relationship with dengue virus, the urban growth also provided ideal environmental and ecological conditions for aedes mosquito population and genetic change in *Zika virus* (new viral strains) lead to the emergence of *Zika virus* infections with greater epidemic potential and virulence. It is not possible to accurately predict when the next pathogen will emerge or what it will happen but the experience of *Zika virus* emphasises on need to be prepared and face the worst case scenarios.

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