

Short Communication

Tiger mosquito poses a new threat: the Zika Virus

Nilika¹, Gaurav Kamboj²

¹Lecturer, Dept. of Pediatric and Preventive Dentistry, Yamuna Institute of Dental Sciences and Research, Gadholi, Haryana, India

²Junior resident, Dept. of Community Medicine, Pt. B.D. Sharma PGIMS, Rohtak, Haryana, India

***Corresponding author**

Gaurav Kamboj

Email: dr.gauravkamboj@yahoo.com

Abstract: Zika virus (ZIKV) infection has emerged as the latest health threat of international concern. In 1952, the first human cases of Zika were detected and since then, outbreaks of Zika have been reported in tropical Africa, Southeast Asia, and the Pacific Islands. This mosquito-borne disease is a serious threat; it is usually so mild and difficult to be undetectable in adults, yet it has been followed by a surge in babies born with underdeveloped heads, a condition called microcephaly. Substantial new research has strengthened the association between Zika infection and the occurrence of fetal malformations and neurological disorders. The ZIKV natural transmission cycle involves mosquitoes, especially *Aedes* spp., but perinatal transmission and potential risk for transfusion-transmitted ZIKV infections has also been demonstrated. Vector control measures and appropriate personal protective measures should be aggressively promoted and implemented to reduce the risk of exposure to Zika virus.

Keywords: Emerging Infections, Zika Virus, ZIKV, *Aedes* mosquito

Introduction

Scary new viruses continue to emerge abruptly in modern world, provoking stark headlines which demands bold government action. But in most of these cases, the causes are complex and might have developed, unnoticed, over years or decades. This applies true again for Zika, a virus which was unknown to most people until the recent days, and now suddenly a subject of melancholic warnings from the Centers for Disease Control and Prevention as well as World Health Organization. Zikavirus (ZIKV) infection has emerged as the latest health threat of international concern. It is a single-stranded [1], positive sense RNA virus belonging to the family Flaviviridae and genus Flavivirus. It is an emerging mosquito-borne virus that was first identified in 1947 from a rhesus monkey in the Zika forest of Uganda [2]. In 1952, the first human cases of Zika were detected and since then, outbreaks of Zika have been reported in tropical Africa, Southeast Asia, and the Pacific Islands [3]. In 2007, ZIKV emerged outside of Asia and Africa for the first time and caused an epidemic on Yap Island in the Federated States of Micronesia, which was followed by a large epidemic in French Polynesia in 2013–14 [4]. Subsequently ZIKV spread to several countries in Oceania. The appearance of an infectious disease with epidemic potential in a

new part of the world is always an immediate cause for concern. The absence of population immunity gives the virus license to spread rapidly and behave in possibly unexpected ways.

What actually the threat is?

The most common symptoms of Zika fever are rash, fever, arthralgia, and conjunctivitis. This mosquito-borne disease is a serious threat; it is usually so mild and difficult to be undetectable in adults, yet it has been followed by a surge in babies born with underdeveloped heads, a condition called microcephaly. Recently in Brazil, local health authorities have observed an increase in Guillain-Barré syndrome which coincided with Zika virus infections in the general public, as well as an increase in babies born with microcephaly in Northeast Brazil. Substantial new research has strengthened the association between Zika infection and the occurrence of fetal malformations and neurological disorders [5]. Fetal malformations place a heart-breaking strain on families and communities as well as systems for health care and social support. Neurological disorders like Guillain-Barré syndrome call for added capacity to provide life-saving intensive care. Guillain-Barré syndrome (GBS) is a rare disorder in which a person's own immune system damages their

nerve cells, causing muscle weakness and sometimes paralysis.

The ZIKV natural transmission cycle involves mosquitoes, especially *Aedes* spp., but perinatal transmission and potential risk for transfusion-transmitted ZIKV infections has also been demonstrated. Moreover, ZIKV transmission by sexual intercourse has also been suggested [6].

Detection of ZIKV infection

The diagnosis of Zika virus infection is made through molecular and serologic testing. This includes reverse transcription polymerase chain reaction (RT-PCR) for viral RNA, and immunoglobulin (Ig) M ELISA and plaque reduction neutralization test (PRNT) for Zika virus antibodies. Due to the high visibility of the Zika outbreak, a number of *In vitro* diagnostic (IVD) manufacturers have already expressed an interest in developing assays to support the outbreak. More than 30 IVDs have been developed or are at various stages of development. Of the few IVDs commercially available, even fewer have undergone regulatory premarket assessment [5].

Knowing more about ZIKV

Zika virus (ZIKV) belongs to the family of flaviviridae and to the antigenic complex Spondweni [7]. It is also closely related to the four dengue viruses, as evidenced by strong serologic cross-reactivity. Genotyping and geographical analysis have revealed an African and an Asian lineage, but sequence homology is high and the clinical and serologic relevance is unclear. It is assumed that a ZIKV vaccine can be developed building on the same technologies that have been successfully used to develop human flavivirus vaccines (Yellow Fever, Tick-Borne Encephalitis, Japanese Encephalitis, Dengue). Vaccination of pregnant women and women of childbearing age is the main target, and pragmatic strategies will be needed to fast-track the development of a safe and effective product.

Preventive strategies against spread of ZIKV

Prevention involves reducing mosquito populations and avoiding bites, which occur mainly during the day. Eliminating and controlling *Aedes aegypti* mosquito breeding sites reduces the chances that Zika, chikungunya, and dengue will be transmitted. An integrated response is required, involving action in several areas, including health, education, and the environment. Vector control measures and appropriate personal protective measures should be aggressively promoted and implemented to reduce the risk of exposure to Zika virus. Attention should be given to ensuring women of childbearing age and particularly pregnant women have the necessary information and materials to reduce risk of exposure. Pregnant women who have been exposed to Zika virus should be

counselled and followed for birth outcomes based on the best available information and national practice and policies.

The future of ZIKV is unpredictable, but the worldwide spread of DENV and CHIKV—closely tied to the trends of urbanisation and globalisation, suggests that ZIKV has the potential to follow in their path. Reliable and sensitive surveillance of arboviral disease that includes a system for the detection of emerging pathogens is of paramount importance to manage the complex challenges ahead.

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