



Zika virus disease: an alarming situation resurfacing on the radar – a short communication

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Background/introduction: On the 13th of December 2022, a 5-year-old girl from Karnataka, India, tested positive for Zika virus. The first Zika virus was isolated from the serum of a rhesus monkey in the Zika Forest of Uganda in 1947. Zika virus was largely dormant for about 70 years before suddenly resurfacing across all of America, from Brazil to the Pacific Islands and is connected to a grouping of microcephaly phenotypes based on a complete virus genome analysis. All of the aforementioned research provides an overview of the migration of this virus from the Americas to continental Africa via mosquitoes. The current study, therefore, aims to evaluate the virologic characteristics, prophylaxis, transmitting mechanisms, diagnosis, clinical manifestations, and treatment of ZIKV infection in light of the virus's widespread dissemination and deadly nature.

Aim: The investigation's findings aim to demonstrate that in order to prevent further outbreaks, there is a national requirement for active epidemiological and entomological observation of Zika.

Materials and methods: Data were extracted from academic journals of medicine published in MEDLINE, PubMed, ScienceDirect, Ovid, and Embase inventory databases with a predetermined search strategy. Articles considering the Zika virus and its clinical manifestations, especially neurological, were included.

Results: The Zika virus has been declared a public health emergency of global significance by the World Health Organization (WHO). It is of alarming concern that it is now one of the most prevalent infectious diseases associated with birth abnormalities discovered in the past five decades. The onset and accelerated spread of disease to other parts of the world is attributed to the migration of infected hosts and climate change. Rapid laboratory diagnosis, evaluation of serological techniques, and virus isolation are urgently needed, along with newer modalities such as mathematical modeling as prediction devices to curb this issue. Due to its grave neurological manifestations, it is mandated to engineer peptide therapies and a virus-specific vaccination to treat this neurotropic virus.

Conclusion: There is currently no vaccination against Zika virus infection. If societies are not adequately prepared, the epidemiological wave will have an impact on the workforce and could pose a serious threat. To alleviate the significant cost on health systems and manage its promotion globally, improved investigation and response activities are needed.

Keywords: Zika virus, neurotropic virus, birth anomalies, globalization

Background

There is a significant chance that Zika virus disease could become rampant in India due to the triple threat of infectious illnesses

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(environment, agent, and host), which is especially worrisome given the context of the current epidemic. Zika virus belonging to the *Flaviviridae* family under the genus *Flavivirus* is an arbovirus whose initial isolation was in 1947 from a rhesus monkey in Uganda's Zika Forest for the purpose of studying yellow fever^[1]. Being the first severe infectious disease linked to teratogenic defects in more than 50 years, it was classified as a Public Health Emergency of International Concern by the World Health Organization (WHO)^[1].

Ontogenetically the ZIKV is relatively close to the yellow fever virus, dengue virus, Japanese encephalitis virus, and the West Nile fever virus^[2]. The virus is transmitted mostly through female mosquito bites, principally from the species *Aedes aegypti* and *Aedes albopictus*^[3]. Other less common methods for the transmission of the Zika disease are sexual transfusions, mother to neonate, transplants, and rare laboratory accidents^[2]. Nonsynonymous mutations in the ZIKV genome may give rise to viral entries, particle assembly, RNA replication, and viral load, and as a result, new virulent variants in humans may occur. The symptoms of Zika are made up of headache, fever, and joint pain, but it leads to a growing number of microcephaly, Guillain-Barré syndrome, meningoencephalitis, and myelitis as well^[3].

Growing globalization, increasing travel and commerce, and the ubiquity of vectors (*Aedes* mosquito) are likely to be blamed for the epidemiological spread of the virus around the world. Newly identified nonvector means of transmission, such as sexual contact, the transplacental route, breastfeeding, and transfusions, have also contributed to the spread^[4].

As mentioned below (Table 1), India reported its first four Zika virus cases in 2016–2017 in states – Gujarat and Tamil Nadu^[5]. The greatest Zika virus spread in India was recorded in the states of Rajasthan and Madhya Pradesh between September and November 2018. In total, 159 cases and 130 cases in the states of Rajasthan and Madhya Pradesh, respectively, were found to be Zika virus positive by RT-PCR (reverse transcription polymerase chain reaction). Subsequently, Kerala, a state in southern India, reported a new case after 3 years in July 2021. By August 2021, many tests had found at least 70 new Zika virus infections^[6].

WHO has implemented the Global Arbovirus Initiative as a strategy to support the Zika Strategic Response Plan set by the multidisciplinary team commissioned by the central government for conducting surveillance and containment of Zika virus disease. Since research showed that there was a high risk of transmitting the infection sexually, WHO has recommended sexual abstinence and practice of safe sex among people living in regions with active transmissions of Zika virus disease^[7].

Recommendations to curb the Zika virus outbreak

For individuals

ZIKV transfers mosquitoes bites anytime, so the use of mosquito repellents which is safer and more suitable as per recommendation by the United States Environmental Protection Agency (EPA); repellents (DEET – *N,N*-diethyl-*meta*-toluamide – application on exposed skin and wearing of permethrin-treated clothes)^[8]. Installing nets or screens on doors and windows, destroying mosquito breeding sites like ponds, flowerpots, and other egg-laying places, and wearing proper long sleeves shirts and pants are crucial for prevention and transmission. The use of the latest technology, which involves the release of mosquitoes incorporated with *Wolbachia*, the endosymbiotic bacteria, genetically engineered male mosquitoes, and autocidal gravid ovitraps has been found useful for the elimination of vector mosquitoes^[9]. Persons having a history of infection by Zika virus, either symptomatic or asymptomatic, and recent travel to endemic or high-risk areas should not donate blood without consulting health experts.

For the Governments

Molecular-based detection of ZIKV is expensive, while serology-based diagnosis is very challenging for healthcare professionals. Patients present with signs and symptoms of Zika virus disease during the rainy season, particularly in the region endemic to other

arboviral infections. Countries having limited resources and a scarcity of specialized laboratories should focus on strict preventive measures, arrangement, and distribution of bed nets to the public, implementation of regular fumigation of garbage sites, mosquito breeding places with WHO recommended insecticide, and providing mosquito repellents at low costs. Making societies aware of the Zika virus by organizing seminars or community-based awareness programs at the level of villages and districts will reduce the future burden on healthcare systems and help to limit the transmission. Studies report that the children born of couples who were exposed to the Zika virus, regardless of symptoms during pregnancy, had varying degrees of developmental anomalies ranging from microcephaly, eye defects, contractures, intrauterine growth retardation, neurodevelopmental delay, language, and cognitive impairment later in life^[10]. In a study conducted in 13 Indian states as well as a union territory, the blood samples of 1475 patients were retested and screened for dengue, chikungunya, and Zika from May to October 2021. Surprisingly, among the tested cases, there were positive results for chikungunya^[10], dengue (121), and Zika (67). Dengue/Zika, dengue/chikungunya, as well as dengue/chikungunya/Zika co-infections were also identified^[10].

According to the WHO, no specific Zika virus disease treatment or vaccine has been obtained for treating or preventing the infection, respectively; however, active research is ongoing for the development of the Zika virus disease vaccine. In order to formulate peptide therapies to unlock the possibility of using brain-permeable polypeptides to treat viruses that affect the central nervous system, engineering methods should be used^[6]. In India, the National Vector Borne Disease Control Programme under the Ministry of Health is aggressively working to control the *Aedes* mosquito in order to combat dengue and chikungunya, in regards to which, there is still considerable work to be done. Animal models of ZKV are urgently needed in order to demonstrate maternal–fetal transmission, establish its neurologic signs, and report on the impact of the virus on the immune system of the host and sexual practices throughout the course of the host's lifetime. Understanding the dynamics of Zika virus advancement via mathematical modeling may be useful for developing control measures against the disease's dynamics of progression.

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Consent

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Author contribution

All authors contributed to the conceptualization of ideas, critical reviews with comments, and approved the final draft.

Conflicts of interest disclosure

No conflicts of interest were declared.

Table 1
Number of cases (state-wise) reported in India before

Serial number	Names of states in India	Number of cases	Year
1.	Gujarat and Tamil Nadu	4	2016–2017
2.	Rajasthan	159	2018
3.	Madhya Pradesh	130	2018
4.	Kerala	1	2021

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Guarantor

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