Zika Virus: Can India Win the Fight?

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ABSTRACT

Zika virus is an emerging arbovirus of public health importance transmitted by Aedes mosquito which also transmits dengue, chikungunya and yellow fever. The disease has been spreading at an alarming rate in Africa, Pacific Islands, and the Americas. Given the expansion of environments where mosquitoes can live and breed, facilitated by urbanization and globalization, there is potential for major urban epidemics of Zika virus disease to occur globally. World Health Organization (WHO) has declared Zika virus disease to be a Public Health Emergency of International Concern (PHEIC). Our failed attempts to control dengue epidemics in the past call for concern and we need to be prepared to fight Zika virus before it arrives at our doors.

Keywords: Microcephaly, PHEIC, WHO, zika virus

Introduction

Zika virus is an emerging arthropod borne virus transmitted by the Aedes group of mosquitoes. This virus belongs to the genus Flavivirus, family Flaviviridae and is closely related to other flaviviruses of public health importance including dengue fever, chikungunya and yellow fever.[1] Zika virus was first isolated from a rhesus monkey in the Zika Forest of Uganda, in 1947 and for many years, the virus was responsible for causing sporadic human infections in Africa and Asia.[2] In 2007, the first documented outbreak of Zika virus disease occurred in the Pacific. Since 2013, cases and outbreaks of the disease have been reported from the Western Pacific, Africa and the Americas.[3,4] As of now, 70 countries and territories [Table 1] have reported evidence of mosquito-borne Zika virus transmission since 2007 (67 with reports from 2015), 53 with a first reported outbreak from 2015 onwards. Since February 2016, 11 countries have reported evidence of person-to-person transmission of Zika virus. 20 countries or territories have reported microcephaly and other CNS malformations potentially associated with Zika virus infection or suggestive of congenital infection.[4]

A steep increase in microcephaly cases in babies and in cases of Guillain-Barre syndrome has been associated with the arrival of the virus. A causal relationship between Zika virus infection and birth malformations, neurological syndromes has not yet been established, but is strongly suspected.[6,7]

The recent changes in the epidemiology and possible links with microcephaly cases and other neurological disorders have rapidly changed the risk profile of the disease to an extraordinary event and it has been declared by WHO as a PHEIC.[8]
Challenges

The various challenges are:

Limited knowledge about epidemiological characteristics of virus and its interaction with other arboviruses, such as dengue. Limited lab capacity and cross reactivity of diagnostic flavivirus antibody assays.

Absence of population immunity in newly affected countries. High mobility of population and cross-border movement of travelers with infections.

Increase in incidence of microcephaly and other birth defects in babies as well as in cases of Guillain-Barre syndrome and other neurological syndromes at the same time of an outbreak of Zika virus. Lack of vaccines or antiviral treatment.

Favorable breeding conditions for Aedes mosquitoes and our inability to control mosquito breeding in the past for dengue. Poor surveillance system. Underfunded and inadequate infrastructure in healthcare system in India resulting in inadequate outbreak control response.

Recommendations

Enhanced and strengthened surveillance: Urgently establish surveillance systems in hospitals and the community to track clustering of cases of acute febrile illness with rash, muscle and joint pains, if any, among those who have travelled to areas with ongoing transmission in the 2 weeks preceding the onset of symptoms. Also, keep a lookout for clustering of cases of microcephaly among newborns and reporting of Guillian Barre Syndrome.[6]

Establish rapid response teams: Put together numerous rapid response teams with capacity to investigate and manage the Zika virus disease outbreak. Each team should comprise of an epidemiologist or public health specialist, medical / pediatric specialist, microbiologist other experts like entomologist, etc.[9] They should be well aware of and trained about the disease.

Enhanced risk communications: Boost up risk communications to address population concerns, enhance community engagement, improve reporting, and ensure application of vector control, personal protective measures.

Establish access to a qualified diagnostic laboratory

Zika virus is diagnosed through polymerase chain reaction and virus isolation from blood samples. Diagnosis by serology can be difficult as the virus can cross-react with other flaviviruses such as dengue and
yellow fever. Reverse transcriptase-polymerase chain reaction (RT-PCR) is the primary means of diagnosis, while virus isolation is largely for research purposes.\textsuperscript{[10]}

National Centre for Disease Control (NCDC), Delhi and National Institute of Virology (NIV), Pune, should be made the apex laboratories to support the outbreak investigation and for confirmation of laboratory diagnosis of Zika virus disease. Additional laboratories in different states should be strengthened to expand the scope of laboratory diagnosis.

**Regular vector surveillance and integrated vector management (IVM)**

Aedes aegypti is the main vector species of Zika virus disease. This vector is widely prevalent in India due to deficient water management, inadequate drainage system, poor sanitation and lack of public awareness about breeding. Therefore, the key to control Zika virus disease is to adopt a comprehensive approach by way of regular vector surveillance and integrated vector management of the Aedes mosquitoes.

Vector surveillance is carried out through various larval indices, biting and resting collection of adult mosquitoes. Integrated vector management involves environment modification/ manipulation, personal protection through protective clothing and repellents, biological control using larvivorous fish and bacillus thuringiensis, chemical control using larvicides (temephos) and adulticides (pyrethrum, malathion), and legislative measures.

**Pregnant women** who have travelled to areas with Zika virus transmission should mention about the same during ante-natal visits in order to be assessed and monitored appropriately. Pregnant women or women who are trying for pregnancy should defer/ cancel their travel to the affected areas.\textsuperscript{[10]} Attention should be given to ensuring that women of childbearing age and particularly pregnant women have the necessary information and materials to reduce risk of exposure.

**Travel measures**

Non-essential travel to the affected countries should be deferred/ cancelled. All travelers to the affected countries/ areas should strictly follow individual protective measures, especially during day time, to prevent mosquito bites (use of mosquito repellent creams, electronic mosquito repellents, use of bed nets, and clothes that appropriately cover most of the body parts).\textsuperscript{[11]} Persons with co-morbid conditions (diabetes, hypertension, chronic respiratory illness, immune disorders, etc.) should seek advice from the nearest health facility, prior to travel to an affected country. Travelers having febrile illness within two weeks of return from an affected country should report to the nearest health facility at the earliest.

All International Airports / Ports should display billboards/ signage providing information to travelers on Zika virus disease and to report to authorities if they are returning from affected countries and suffering from febrile illness. Standard WHO recommendations regarding disinfection of aircraft and airports should be implemented.

**Health education for community mobilization**

Community and health workers must be empowered with knowledge about mode of transmission, possible link to adverse pregnancy outcome, vector control options, and availability of services in addition to correct treatment. The community should also be engaged in vector control measures. Thus, community mobilization requires intense Behavior Change Communication (BCC). Campaigns must be carried out through mass media including newspapers, radio, TV and hoardings. Health education materials should be developed and widely disseminated for increasing awareness.

**Inter-sector convergence and Co-ordination with International agencies**

It is essential to focus on involvement of hospitals, schools/ colleges, NGOs, Community based Organizations like Resident Welfare Associations, and the corporate sector for effective control of Zika virus disease.

A coordinated international response is needed to minimize the threat and reduce the risk of an epidemic. Authorities should ensure rapid, timely reporting and sharing of information regarding the PHEIC to WHO to facilitate understanding of the disease, for control measures, and to prioritize further research and development.\textsuperscript{[10]}

Appropriate research and development efforts should be intensified for Zika virus diagnostics, vaccines and therapeutics.

**Conclusion**

The present Zika virus threat needs to be our immediate priority and it requires collaboration between government, public health care system and the community.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Cao-Lormeau VM, Musso D. Emerging arboviruses in the Pacific. Lancet 2014;384:1571-2.
2. WHO Media Center. Zika Virus. Disease Factsheet. 2016;http://www.who.int/mediacentre/factsheets/zika/en/ [Last accessed on 2016 August 23].
3. Duffy M.R, Chen T.H, Hancock W.T, Powers A.M, Kool J.L, Lanciotti R.S, et al. Zika virus outbreak on Yap Island, Federated States of Micronesia. N Engl J Med 2009;360:2536-43.
4. WHO Media Centre. WHO Statement on the meeting of the international health regulations. Emergency Committee Regarding 2016 Zika Outbreak in Americas. 2016;http://www.who.int/mediacentre/news/statements/2016/emergency-committeezaika/ [Last accessed on 2016 January 26].
5. WHO Media Centre. Zika Situation report dated 25 August 2016. 2016;http://www.who.int/emergencies/zika-virus/situation-report/25-august-2016/en/ [Last accessed on 2016 August 26].
6. CDC. Zika Virus Transmission Risks. http://www.cdc.gov/zika/transmission/index.html [Last accessed on 2016 February 21].
7. CDC. Zika Virus Symptoms Diagnosis Treatment. http://www.cdc.gov/zika/symptoms/index.html [Last accessed on 2016 February 21].
8. Pan American Health Organization (PAHO)/World Health Organization. Epidemiological Alert: Increase of microcephaly in the northeast of Brazil. 2015;http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=32285&lang=en [Last accessed on 2016 January 24].
9. World Health Organization. Report of the Ebola Interim Assessment Panel. http://www.who.int/csr/resources/publications/ebola/ebola-panel-report/en/ [Last accessed on 2016 January 24].
10. World Health Organization. Zika virus outbreak global response. 2016;http://www.who.int/emergencies/zika-virus/response/en/ [Last accessed on 2016 July 18].
11. CDC. CDC health advisory: recognizing, managing, and reporting Zika virus infections in travellers returning from Central America, South America, the Caribbean and Mexico. Atlanta, GA: US Department of Health and Human Services, CDC. 2016;http://emergency.cdc.gov/han/han00385.asp [Last accessed on 2016 February 21].

Congratulations

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