

## Review article

### Zika: A new public health threat for Bangladesh

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#### Abstract

In 1947, scientists routine surveillance programme for yellow fever in the Zika forest of Uganda incidentally isolated the Zika virus from a rhesus monkey, an arthropod-borne RNA virus belongs to family Flaviviridae. ZIKV became a potential pathogen in Asian-continent in 1969, Malaysia is the first country in Asia to encounter ZIKV and was isolated from Aedes mosquitoes in and human cases were confirmed in Indonesia and Pakistan in the early 1980s. WHO declared Zika a public health emergency of international concern in February 2016. Bangladesh experienced Zika virus infection in 2014 for first time; Zika virus exists in two distinct strains: African and Asian. Zika (ZIKV) and dengue (DENV) co-transmission during the 2023 dengue outbreak in Bangladesh, necessitates attention to this important public health and epidemiological issues. Although Zika virus is a vector borne (Mosquito borne) disease, ZIKV can also be transmitted through sexual intercourse, blood transfusion, mother-to-child horizontal transmission organ/tissue transplantation or even by secondary non-sexual physical contact. Among the persons suffering from Zika virus infection, symptoms typically start 3–14 days after infection, and include rash, fever, conjunctivitis, myalgia, arthralgia, malaise and headache; usually for 2–7 days. Infection occurs during pregnancy, can cause congenital anomaly - microcephaly and can be associated with other complications including fetal loss, stillbirth and preterm birth. Control measures of Zika infection include mobilizing house-to-house visits and the elimination of potential Aedes breeding sites, spraying insecticide, drainage of standing water, waste management and health education and personal protection measures.

**Key words:** Zika virus, Mosquito borne viral disease, microcephaly.

#### Background

Zika virus (ZIKV), first isolated in Uganda in 1947 from Rhesus monkeys is an arthropod-borne virus, RNA virus belongs to family Flaviviridae. It was a sporadic benign-human infection in Africa during the early 1960s until the middle of 1980s; ZIKV became a potential pathogen in Asian-continent in 1969. Malaysia is the first country in Asia to encounter ZIKV and was isolated from Aedes mosquitoes in and human cases were confirmed in Indonesia and Pakistan in the early 1980s. Several studies also documented widespread population exposure with ZIKV but with mild clinical manifestations and since no outbreak had been reported, therefore, ZIKV failed to attract enough attention, globally.<sup>1</sup>

ZIKV-epidemics broke out in Yap Island, Micronesia since 2007 and another large outbreak in French Polynesia during 2013–2014. Brazil suffered epidemic and the disease was associated with microcephaly and other neurological disorders. WHO confirmed active ZIKV infections in 61 countries in March 2017 from America, Africa and Western Pacific regions. Distribution of Aedes-mosquito, effect of global

warming on climate change enhances the spread of ZIKV infections across the globe.<sup>2</sup>

In 1947, scientists were in routine surveillance programme for yellow fever in the Zika forest of Uganda incidentally isolated the Zika virus from a rhesus monkey. Subsequently in 1948, the virus was found in the mosquito Aedes africanus from a tree platform in the Zika forest. In The first human cases are detected in Uganda and the United Republic of Tanzania in 1952.<sup>3</sup>

Bangladesh experienced Zika virus infection in 2014 for first time and witnessed a rise in Zika virus cases in recent months (2024), with eight individuals tested positive for the virus. This comes after 5 cases were reported in 2023.<sup>4,5</sup>

#### The virus strain and mode of transmission

The Zika virus exists in two distinct strains: African and Asian.<sup>6</sup> Zika (ZIKV) and dengue (DENV) co-transmission during the 2023 dengue outbreak in Bangladesh, necessitates attention to this important public health and epidemiological issues.<sup>7</sup>

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Recent studies researchers have confirmed that the strain circulating in Dhaka is of the Asian variety. The main vectors for transmission of Zika infection is *Aedes* mosquitoes, in particular, *Aedes aegypti* that was first identified in 1947 in monkeys in Uganda's Zika Forest. Subsequently found to be transmitted to humans in Uganda and Tanzania in 1952.<sup>8,9,10</sup>

Between 1960 and 1980, Zika spread across Africa and Asian countries, with a severe outbreak in 2007 on Yap Island in Micronesia.<sup>11</sup> A severe outbreak in Brazil in 2015 the World Health Organization (WHO) established ZIKV as a public health emergency of international concern in February 2016.<sup>12</sup> Real-time data on Zika Virus outbreaks and transmission is hard to documented as of the cases are subclinical and there is co-infection with dengue or chikungunya infection.<sup>13</sup> Moreover, some countries lack reliable reporting and monitoring systems for Zika that track virus transmission posing potential threat of impending outbreak.<sup>14</sup>

Presence of ZIKV raises serious public health concerns in Bangladesh owing to its association with congenital anomalies/neurological-manifestations. Therefore, it is recommended that every suspected viral fever patient, particularly pregnant women be screened for ZIKV infection to rule out a new emerging infection in Bangladesh.<sup>15</sup> The first identification of ZIKV in Dhaka city and the first report of ZIKV-DENV co-infection in Bangladesh posed serious issues for diagnosis and control of Zika infection in Bangladesh which necessitates meticulous surveillance and public health interventions to stop the endemicity and the spread and impact of ZIKV in dengue-endemic regions.<sup>16</sup>

Although Zika virus is a vector borne (Mosquito borne) disease, ZIKV can also be transmitted through sexual intercourse, blood transfusion, mother-to-child horizontal transmission organ/tissue transplantation or even by secondary non-sexual physical contact.<sup>17</sup> Zika virus is mainly transmitted through the bite of an infected mosquito *Aedes aegypti* in tropical and subtropical, *Aedes albopictus* is the vector in temperate regions. After confirmation from numerous virus isolations from mosquitoes, *Aedes* mosquito is confirmed to be the natural reservoirs of infection. Vertebrate hosts are mainly amplifying or dead-end hosts.<sup>18</sup>

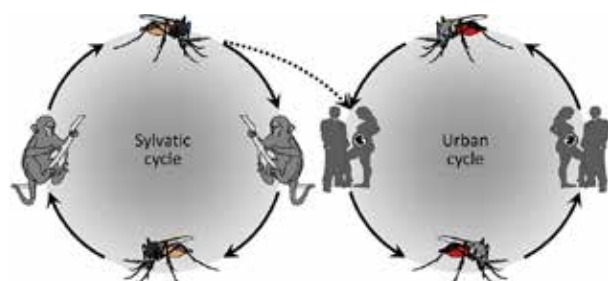


Fig. Vector-borne transmission of ZIKV. There are two mosquito-driven transmission cycles: (1) a sylvatic cycle,

in which the virus cycles between non-human primates and arboreal mosquitoes; and (2) an urban cycle, in which the virus cycles between humans and urban mosquitoes. Under certain circumstances, ZIKV can presumably be transmitted from non-human primates to humans via arboreal mosquitoes.<sup>19</sup>

Dengue is the most common virus causing typical fever with rash-like illness among traveler, other viruses such as Zika virus are also now co-circulating in some of the tourist destinations, where the management of the patient may be difficult.<sup>20</sup>

## Sign/Symptoms and complication

Symptoms of Zika are mostly mild, with only 1 in 5 infected people exhibiting any signs of illness. Hospitalization is rare with this infection. Zika can cross the placenta and affect the fetus.<sup>21,22</sup> Among the persons suffering from Zika virus infection, symptoms typically start 3–14 days after infection, and include rash, fever, conjunctivitis, myalgia, arthralgia, malaise and headache; usually for 2–7 days. These symptoms are common to other arboviral and non-arboviral diseases; thus, the diagnosis of Zika virus infection requires laboratory confirmation.<sup>23</sup>

The incubation period of Zika virus disease is estimated to be 3–14 days. Most of the people infected with Zika virus asymptomatic. Generally symptoms are mild which include fever, rash, conjunctivitis, myalgia, arthralgia, malaise, and headache which usually last for 2–7 days.<sup>24</sup>

In rare cases hospitalization from Zika virus infection is required. If Zika virus infection occurs during pregnancy, can cause can cause congenital anomaly - microcephaly and can be associated with other complications including fetal loss, stillbirth and preterm birth.

Clinical manifestations of human Zika virus infection changed characteristics with its geographical expansion. Once sporadic infection of equatorial Africa and Asia, Zika-fever is now spreading to America, Caribbean and Western Pacific regions.<sup>25</sup>

Man is not natural reservoir of Zika virus. But recent *in vitro* studies in primary cell cultures derived from the placenta, kidney, nervous tissue, and in the brain of severely damaged fetus suggests the potential ability of these tissue reservoirs to support infection and amplification of ZIKV.<sup>26</sup>

Zika infection rarely may cause Guillain-Barré syndrome (GBS). In very rare cases, may cause encephalitis, meningitis or myelitis. Zika may also cause a bleeding disorder resulting in bleeding, bruising, or delayed clotting.<sup>27</sup>

Similar global geographic distribution shared both by Zika and dengue virus and have infections with similar

clinical presentations. Patients suspected for Zika virus infection should also be evaluated for possible dengue.<sup>28</sup>

### Diagnosis

Diagnosis of Zika virus Infection may be suspected based on symptoms of persons living in or visiting an Zika infection endemic areas. A diagnosis can only be confirmed by laboratory tests of blood or other body fluids, but it must be differentiated from cross-reaction from other flaviviruses such as dengue virus.<sup>29</sup>

Zika virus testing is limited to symptomatic individuals, pregnant women, and neonates/infants born to confirmed or suspected mothers or those with symptoms of congenital Zika syndrome (CZS). Serology is **not routinely recommended** due to its lack of specificity for diagnosing recent infection. Molecular testing to detect ZIKV nucleic acids is the **preferred testing modality** when performed **within 14 days of symptom onset**. PCR and gM and IgG are tested for Zika virus.<sup>30</sup>

### Control measures

Control measures of Zika infection include mobilizing house-to-house visits and the elimination of potential Aedes breeding sites, spraying of the product to kill larvae or adult mosquito, and reduction of breeding sites through drainage of standing water, waste management and education about mosquitoes and personal protection measures.<sup>31</sup>

The following actions should be implemented by the public health authorities to prevent and control Zika virus disease i) Epidemiological and entomological investigations, ii) Ongoing active case finding in the neighbourhood where the case is living, iii) Retrospective case finding through a survey for healthcare workers (private sector, local health facilities, and clinical laboratories), iv) Vector control measures have to be implemented in accordance with the government plan for dengue, chikungunya virus disease and ZIKV disease. Vector control measures focus on active search for Aedes mosquito, use of insecticides, and environmental sanitation and v) Public communication and awareness campaign.<sup>32</sup>

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