

The zika virus: twelve months after WHO declared a state of emergency, much remains to be done in preventing and controlling

Abstract

The zika virus or zika virus or Zika virus English, Zika virus, abbreviation: ZIKV is a virus of the genus *Flavivirus*. In humans, transmitted through the bite of the mosquito *Aedes aegypti*, causes the disease also known as zika-which although it rarely causes complications for its carrier, presents signs of to cause congenital microcephaly (when acquired by pregnant women, which may harm the fetus in some cases). The name Zika originates in the Zika forest near Entebbe, capital of the Republic of Uganda, where the virus was first isolated in 1947. It is related to dengue virus, yellow fever and Nile encephalitis viruses, which also are part of the *Flaviviridae* family. Currently, Latin America is facing an outbreak of zika virus. It is suspected that the entry of the virus in Brazil occurred during the 2014 World Cup, when the country received tourists from various parts of the world, including tropical areas most affected by the virus, such as Africa-where it emerged-and French Polynesia in Oceania. In the first half of 2015, there were already confirmed cases in states in all regions of the country. With milder symptoms than those of dengue fever and chikungunya fever (diseases also transmitted by the *Aedes aegypti* mosquito), zika was initially ignored by health authorities; but there is evidence that infection with zic virus is associated with more severe cases, such as congenital microcephaly and Guillain-Barré syndrome, which, although they remain rare conditions, increased uncommonly in the country in the year 2015. Other diseases can cause problems in the formation of the fetus, especially if acquired by the pregnant woman during the first three months of gestation. Rubella, toxoplasmosis, syphilis and infections caused by cytomegalovirus are the main causes of microcephaly. There are also other causes, such as drug use, excessive alcohol consumption, and exposure to chemicals. Microcephaly can occur as a result of all of them. There are still few scientifically proven cases of the relationship between zika and microcephaly. For the time being, there are many inferred cases (symptoms similar to those of zika but not proven by testing of genetic material). On 1 February, the World Health Organization (WHO) declared the zika virus epidemic a “Public Health Emergency of International Interest” (PHEIC). Until then, WHO had only issued a similar emergency declaration on three occasions: the swine flu pandemic (2009), the resurgence of polio (2014) and the ebola epidemic in West Africa (2014). Since November 2016, urgency has given way to a transitional period in which temporary emergency management mechanisms and recommendations should be replaced by more robust ones and ensuring a long-term response. It is important to note that the latest WHO analyzes have concluded that the zika epidemic retains its risk globally and that cases of virus infections continue to be reported in new regions and countries around the world.

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Introduction

The onset of the virus in Brazil was associated early on with the appearance of severe malformations of the central nervous system in infants potentially exposed to the virus during pregnancy. Although the total number of reported cases has declined in recent months, the virus has spread throughout America.¹ All but three countries (Chile, Paraguay, and Canada) reported autochthonous cases of infection. In the Pacific region, the virus continues to circulate and different outbreaks have been reported in Africa and Southeast Asia, where it is quite likely to spread.² But the real impact is still unknown and more than 2 billion people live in areas at risk of infection. Although the virus can be transmitted through sexual contact, transmission by mosquito bites (genus *Aedes*) is the main route of dissemination. In places where there is no competent vector, the emergency risk is

minimal and efforts should focus on identifying pregnant women who may have contracted the infection. Be it after traveling to a country with active transmission of the virus or through sexual contact with an infected person. Despite the scientific progress made in the last year, there are still many gaps in knowledge about the disease. We know, for example, that infection during pregnancy involves the risk of the fetus developing microcephaly and other neurological malformations, but we can not quantify this risk or predict how it will evolve during pregnancy.³ We also do not know the complete spectrum of birth defects, nor how the development of infants born to infected mothers will be, or whether they can walk and talk normally.⁴ Laboratory diagnosis of infection is still limited to specialized centers, which is a major challenge in places with limited resources. While there are several promising studies, we do not yet have a rapid diagnostic test for the field that has been shown to be sufficiently sensitive and

specific. To date, we have been aware of the existence of two strains of the virus - the African and the Asian - the latter being responsible for the current epidemics in the Pacific and in America. In addition, serious complications such as congenital malformations or neurological syndromes were only associated with the Asian lineage. There is some evidence that the immunity obtained after infection by one of the lineages protects against the other, which is not the case, for example, with the dengue virus. However, we do not know how long the zika immunity lasts after being infected by any of the strains. This issue is critical to an eventual effective vaccine against infection.⁵ Today, several vaccine candidates are in clinical phase and at best it will take 2 to 4 years for a vaccine to reach the public. Likewise, a limited number of drugs have been shown to have antiviral activity in the laboratory, although the path is still relatively long to treat pregnant women, the group most vulnerable to the virus.⁶ The epidemic joined the already complex “ecology” of arboviruses (viruses transmitted by arthropods). In recent decades we have witnessed the emergence and global spread of these virus infections, including dengue fever, chikungunya, West Nile virus and yellow fever, which have in common the “triad” of the modern world in common: urbanization, globalization and international mobility.⁷ Arbovirus-borne diseases have become a priority on the global public health agenda. But such prioritization should be related to adequate support for research and implementation of public health measures to improve prevention, preparedness and response.⁸ The combination of proven interventions to address multiple arboviruses is the strategy that ensures better cost-effectiveness and greater sustainability. However, it is important to note that such funding should not be “redirected” from other programs, to the detriment of resources for highly relevant diseases such as malaria, HIV or tuberculosis. Another fundamental aspect is the flow of communication between the scientific community, the authorities and the population in general. Such communication is necessary for the proper management of the information that implies in supporting the strategies of prevention and response, as well as avoiding the reactions of exaggerated startling. Humanity is under constant threat of the emergence of new infectious agents. It is essential to establish new international partnerships that favor the combination of multidisciplinary efforts and resources to ensure faster and more effective responses to emerging and reemerging diseases.⁹ Figure 1 Zika Virus (ZKV) is a virus transmitted by *Aedes aegypti* mosquitoes (even transmitting dengue fever and chikungunya fever) and *Aedes albopictus*. The Zika virus had its first appearance recorded in 1947, when it was found on monkeys in the Zika Forest in Uganda. However, it was only in 1954 that the first cases in humans were reported in Nigeria.¹⁰ The Zika virus hit Oceania in 2007 and French Polynesia in the year 2013.¹¹ Brazil reported the first cases of Zika virus in 2015 in Rio Grande do Norte and Bahia. Currently, its presence is already documented in about 70 countries. The main contagion by the ZKV is caused by the bite of a mosquito that, after feeding on the blood of someone contaminated, can transport the ZKV throughout its life, transmitting the disease to a population that does not have antibodies against it. The transmission cycle occurs as follows: the female mosquito deposits its eggs in containers with water. When they leave the eggs, the larvae live in the water for about a week. After this period, they become adult mosquitoes, ready to sting people. The *Aedes aegypti* procreates at prodigious speed and the adult mosquito lives on average 45 days. Once the individual is bitten, it usually takes 3 to 12 days for the Zika virus to cause symptoms.¹² The *Aedes aegypti* mosquito is less than one centimeter in length, has a harmless appearance, coffee or black color, and white streaks on the body and

legs. It usually stings in the wee hours of the morning and in the late afternoon, avoiding the strong sun. However, even in the hot hours he can attack in the shade, inside or outside the house. The individual does not notice the sting, because it does not hurt or itch in the moment. Being a mosquito that flies low - up to two meters - it is common for it to sting in the knees, calves and feet. A pregnant woman may transmit the ZKV to the fetus during pregnancy and this form of transmission is related to the occurrence of microcephaly and other serious brain defects of the fetus, in addition, articular, ocular and other malformations alterations have been related to mother ZKV transmission to the fetus and are under study.¹³ The Zika virus can be transmitted through a person’s sexual relationship with Zika to their partners, even if the infected person does not show the symptoms of the disease. There are ongoing studies to find out how long ZKV remains in the semen and vaginal fluids of infected people and how long it can be passed on to sexual partners.¹⁴ In the semen, some scientific studies report a long time of permanence of the ZKV, even long after the disappearance of the symptoms. Persons intending to have children who live in regions of transmission to Zika should talk to their doctor about preventive measures in the pre- and post-conception. This recommendation becomes even more important when one of the individuals has or has had Zika’s diagnosis.¹⁵ It may be necessary to wait a period of up to 6 months to reduce the risk of transmission from one individual to another and eventually from the mother to the fetus. The means of transmission of saliva, urine or breast milk have not yet been confirmed. Although the virus has been identified in these body fluids of people infected with the Zika virus, there are no reports of transmission through these pathways. There is also the possibility of transmission by blood transfusion and other derivatives, with the report of some cases in Brazil, in which the transmission probably occurred by this route. With this concern, Anvisa recently jointly with the Ministry of Health launched Technical Note with some recommendations regarding the clinical screening of blood donors, which essentially stipulate deadlines between the occurrence of the disease or sexual contact with someone sick and the release for the blood donation.¹⁶



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Symptoms of zika virus

The signs of Zika virus infection are similar to dengue symptoms, and begin 3 to 12 days after the mosquito bite. Most individuals, about 80%, after becoming infected with ZKV will not develop any symptoms of the disease. The symptoms of Zika Virus, when present, are:

- I. Low fever (between 37.8°and 38.5°C)
- II. Joint pain (arthralgia), most commonly in the joints of the hands and feet, with possible swelling
- III. Muscle pain (myalgia)
- IV. Headache and behind the eyes
- V. Skin rashes (rashes), accompanied by itching. They can affect the face, trunk, and reach peripheral limbs such as hands and feet
- VI. Conjunctivitis: a picture of redness and swelling in the eyes, but in which there is no secretion.

More rare symptoms of zika virus infection include

- I. Abdominal pain
- II. Diarrhea
- III. Photophobia
- IV. Small ulcers in the oral mucosa.

The symptoms usually last about 2 to 7 days. In occasional cases, joint pain may persist for about 1 month.

Prevention. The mosquito *Aedes aegypti* is the main transmitter of the virus and its larvae are born and raised in standing water. Therefore, avoiding these foci of this vector reproduction is the best way to prevent Zika virus.

Clean the rails

Large reservoirs, such as water tanks, are *Aedes*' most productive breeding grounds, but mosquito larvae can be found in small amounts of water as well. To avoid even these small puddles, gutters and pipes should be checked every month, as a slight clogging can create ideal reservoirs for the development of *Aedes aegypti*.

Put screen on windows. While it is not as effective, since people do not stay all day at home, putting screens on doors and windows can help protect their family against the *Aedes aegypti* mosquito. Figure 2 The problem is when the breeding place is located inside the residence. In that case, the strategy will not succeed. Therefore, do not forget that the elimination of outbreaks of the disease is the most effective way of protection. Take care of the home ponds and aquariums. Fish are large predators of aquatic forms of mosquitoes and therefore, lakes and aquaria represent a lower risk for mosquito proliferation. Greater care should be given to pools that are not cleaned frequently. Be aware with your trash Do not discharge litter into ditches, banks of streams and streams. This ensures that they will remain clear, avoiding accumulation and even flooding. At home, leave the trash cans always well capped. Use of repellents. Repellents are an important strategy to protect mosquito bites. It is recommended, the use of industrialized products, certified by ANVISA. Homemade repellents such as andiroba, cloves, citronella and soybean oil do not have strong scientific evidence of their efficacy and should not be used instead of products approved by regulatory agencies for this purpose. Products currently marketed and authorized as repellents in Brazil can be used safely in gestation and breastfeeding. The use of these repellents in children should respect the packaging restrictions and discussed with the pediatrician. The frequency and manner of use vary from one product to another and should also be followed according to the package. Sunscreens can reduce the activity of repellents. When used in conjunction, apply the shield prior to repellent application.



Figure 2 The *Aedes aegypti* mosquito.

Wear protective clothing

The use of clothes that cover arms and legs reduces the area of exposure to insect bites and constitutes a good strategy to prevent diseases transmitted by these agents. Some products on the market contain repellents such as permethrin that increase the effectiveness of this strategy.

Conclusion

Avoid accumulation of water: The mosquito lays its eggs in clean water, but not necessarily drinking. That's why it's important to throw away old tires, turn bottles upside down, and if the yard is prone to puddles, drain the land. It is also necessary to regularly wash the water bottle of the pet and keep enclosures of water tanks and cisterns. Put sand in the potted plants. The use of dishes in potted plants can generate water accumulation. There are three alternatives: eliminate this dish, wash it regularly or put sand. The sand retains moisture and at the same time keeps the dish from becoming a mosquito breeding ground. Small cracks in kitchens and toilets rarely become the focus of Zika Virus due to the constant use of chemicals such as shampoo, soap and bleach. However, some drains are shallow and retain stagnant water inside. In this case, the ideal is that it is closed with a screen or that is sanitized with disinfectant regularly.

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Conflicts of interest

The author declares there is no conflict of interest.

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