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ZIKA VIRUS INFECTION: THREAT TO HUMAN LIFE

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ABSTRACT

Zika virus disease is caused by a virus is transmitted by the bite of an infected female *Aedes* mosquito. Various species of *Aedes* mosquito may have the potential to transmit ZIKV, but the most commonly associated with ZIKV is *Aedes aegypti*. After an infected mosquito bites a human, the first symptoms of ZIKV can develop in 3 to 12 days but it can be shorter or longer. People with *Zika* virus disease usually have symptoms that can include mild fever, skin rashes, conjunctivitis, muscle and joint pain, malaise or headache. In most cases, the illness is mild with symptoms lasting less than a week. Outbreaks of Zika have occurred in areas of Africa, Southeast Asia and the Pacific Islands. During 2015, Zika virus was found in South America for the first time. Since then, it has spread to many countries in Central and South America and the Caribbean. A possible link between Zika virus infection in pregnant women and subsequent birth defects is being investigated. There is no vaccine or specific treatment for the disease. Treatment instead focuses on relieving symptoms and includes rest, rehydration and medications for fever and pain.

KEYWORDS: Zika fever, ZIKV, *Aedes aegypti*, Vaccine, Gullian Barre syndrome.

INTRODUCTION

Zika virus is a mosquito-transmitted virus in the family Flaviviridae and genus Flavivirus as shown in figure 1. It was initially isolated in 1947 from blood of a febrile sentinel rhesus monkey during a yellow fever study in the Zika forest of Uganda. The virus was subsequently isolated from a pool of *Aedes africanus* mosquitoes collected in 1948 from the same region of the Zika forest; a serologic survey conducted at that time showed that 6.1% of the residents in nearby regions of Uganda had specific antibodies to zika virus.

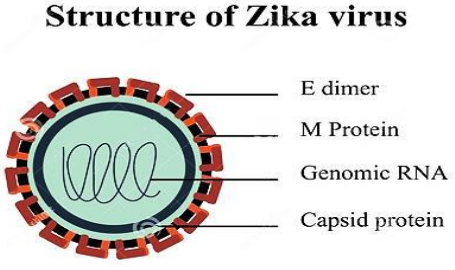

Figure no. 1: Structure of Zika virus.

Epidemiology

The first zika virus outbreak reported outside of Africa and Asia occurred in Micronesia in 2007. This was followed by an outbreak of the same strain in French Polynesia in 2013; since then there have been major outbreaks in other parts of the Pacific. Brazil reported its first case of local transmission of zika virus in May 2015. Since then the virus has spread rapidly, as of 27 January 2016, zika virus transmission is occurring in 23 countries and territories in South/Central America and the Caribbean, as well as in countries outside this region.[1-4] The population in this part of the world had not previously been exposed to zika virus and so lacked immunity. *Aedes* mosquitoes, the main vector for zika virus transmission as shown in figure 2. It is likely that this rapid spread of zika virus will continue until it reaches all countries of the region where the *Aedes* mosquito is found

Figure 2: *Aedes aegypti* mosquito, a vector for zika virus

Transmission

Zika virus is transmitted by the bite of an infected female *Aedes* mosquito. Various species of *Aedes* mosquito may have the potential to transmit zika virus, but the most commonly associated with zika virus is *Aedes aegypti*. After an infected mosquito bites a human, the first symptoms of zika virus can develop in 3 to 12 days but it can be shorter or longer in some people.[5]

In general the mode of transmission of virus is shown in figure 3, human-mosquito-human and direct human to human transmission does not occur. There is circumstantial evidence to suggest that sexual transmission of the virus in human semen can occur but more evidence is required to confirm whether or not this is possible. Zika virus can be transmitted by blood transfusion but standard precautions for ensuring safe blood donations and transfusions should prevent this.[6,7]

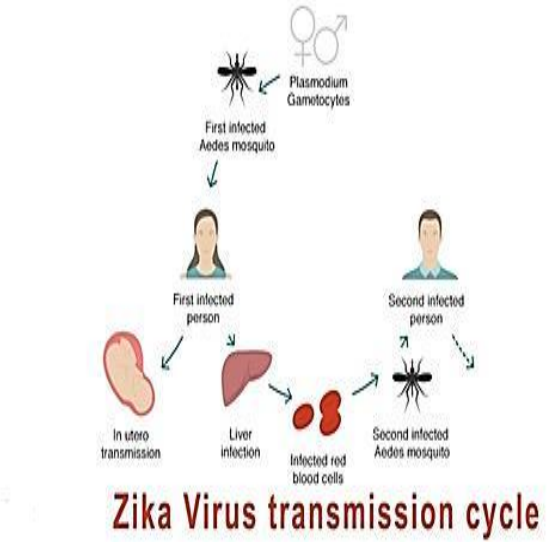

Figure 3: Transmission cycle of zika virus

Cases of maternal fetal transmission have been confirmed. There is currently no evidence that zika virus can be transmitted to babies through breast milk and the advice to mothers to breastfeed remains unchanged.[4]

Pathogenesis[8]

Information regarding pathogenesis of zika virus is scarce but mosquito-borne flaviviruses are thought to replicate initially in dendritic cells near the site of inoculation then spread to lymph nodes and the bloodstream. The incubation period for zika virus disease is not known, but is likely to be a few days to a week. As with other Flaviviruses, viraemia is thought to be short-lived and last only a few days. To date, infectious zika virus has been detected in human blood as early as the day of illness onset; viral nucleic acid has been detected as late as 11 days after onset.

Symptoms of zika virus infection[9-15]

- Mild to severe fever
- Non purulent conjunctivitis
- Joint pain
- Headache
- Myalgia(muscle pain)
- Oedema in lower limb
- Weakness
- Rashes
- Vomiting
- Diarrhoea
- Loss of appetite
- Abdominal pain

Symptoms are usually experienced 3 to 12 days after being bitten by the infected mosquito as shown in figure 4. The evidence shows that symptoms will last for a period of 4 to 7 days and are self limiting.

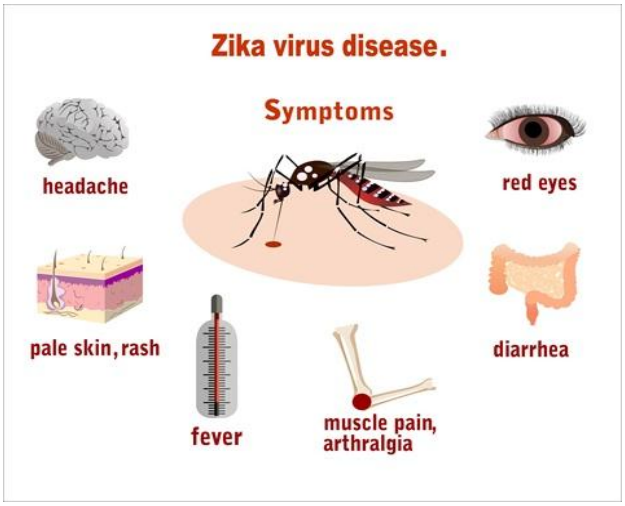

Figure 4: Symptoms of zika virus infection.

Guillain-Barré syndrome has been reported in patients following suspected zika virus infection. In September 2015, researchers reported a substantial increase in the number of cases of neonatal microcephaly as shown in figure 5, among women giving birth in north eastern Brazil and a subsequent increase was reported in southeast Brazil. Zika virus has been isolated from the amniotic fluid of women who were pregnant with infants and the born infants had microcephaly with central nervous system (CNS) abnormalities. Death in a sickle cell patient infected with zika virus has been reported.

Figure 5: Neonatal microcephaly.

Diagnosis[16]

There is no commercially available test for zika virus antibodies or nucleic acid. The PHE Rare and Imported Pathogens Laboratory is currently the only laboratory in England that offers some arboviral diagnostic testing (PCR). During the first week after onset of symptoms, Zika virus RNA can be detected in serum. Virus-specific IgM and neutralizing antibodies typically develop towards the end of the first week of illness; cross-reaction with related flaviviruses (e.g., dengue and yellow fever viruses) is common and can pose a diagnostic challenge.

Treatment[1]

There is no specific treatment for zika virus infection. Pain killers can be taken to reduce fever and pain. Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs), like ibuprofen and naproxen, should be avoided until dengue can be ruled out to reduce the risk of increased bleeding.

Prevention[17]

There is currently no vaccine or drug available to prevent zika virus infection. The *Aedes* mosquito, the main vector for zika virus, is active predominantly during daylight hours; bites are most common during mid-morning and late afternoon to dusk, when the mosquito is most active. This is in contrast to the *Anopheles* mosquito which transmits malaria and which is more active by night. Travellers to countries with ongoing outbreaks of zika virus should take all possible measures to minimise the chances of mosquito bites. This includes wearing light-coloured, loose-fitting clothes that cover as much exposed skin as possible, for example long trousers and long sleeves. Because the *Aedes* mosquito is active during daylight hours, it is important that travellers to these areas cover up during the daytime as much as possible. Clothing can be treated with an insecticide (e.g. permethrin) which kills insects, including mosquitoes, on contact.N, N-diethyl meta toluamide (DEET) based repellents are the most effective insect repellents widely available, and have been in use for over 50 years. Preparations with concentrations of DEET up to 50% are commonly available and are safe in pregnant and breastfeeding women (and in infants and children over the age of 2 months). Care should be taken to ensure that insect repellents are not ingested, and that they do not come in contact with the eyes or mouth. Insect repellents should be re-applied regularly, particularly after swimming and in hot humid conditions when they may be removed by perspiration.Those sleeping during the day in an area with zika virus should sleep under a mosquito net (if sleeping in accommodation without screening). Ideally, nets should be impregnated with permethrin or another contact insecticide. Retreatment after six months of use is necessary.

CONCLUSION

The zika virus has posed a great threat to our lives.Currently there is no specific treatment available for the treatment of zika virus infection. Research is being done across the globe for the specific treatment vaccine for zika virus. Prevention is still a better option than cure in this case.

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