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An overview on ZIKA Virus: Vector Borne Disease

Khalil AL ALI[1], Mouhanad AL ALI[2]

[1]*Medical Laboratory Technology Department, College of applied medical sciences, Taibah University, Al-Madina Almanwra, KSA.*
[2]*Institut Supérieur de la Santé et des Bioproduits d'Angers, université d'Angers*

Abstract

Zika virus disease is a vector borne disease transmitted by several Aedes species. This virus is now considered as emerging pathogen. zika virus infection symptoms are generally mild and can be misdiagnosed with many arboviral infections which cause fever and rash . So far, there is no vaccine or treatment available to treat patient with Zika virus infection. Furthermore, numerous studies have strongly suggested that there is an association between zika virus infection and neurological complications like Guillain - Barré syndrome. In this mini-review we compile recent data on ZIKA virus and its transmission inside and outside the African continent.

Keyword: *Zika virus, arbovirus, arboviral infection, vector borne disease*

INTRODUCTION

Zika virus (ZIKAV) is a single-stranded positive RNA virus of the Flaviviridae family, it is most known for causing flaviviral infectious diseases Zika virus disease is a vector borne disease transmitted by several *Aedes* species such as *Ae. hensilli*, and *Ae. Aegypti Ae. africanus, Ae. Luteocephalus*. [1-4]. Zika virus is now considered as emerging pathogen. It is correlated to other vector borne disease such as West-Nile, dengue and Japanese encephalitis viruses. ZIKAV was discovered for the first time in 1947 in rhesus monkeys in the Zika Forest in Uganda [5].

In 1952, Dick and co-workers have reported for the first time the presence of Zika virus in human serum in Nigeria [5].Since, several researches and investigation were performed to study Zika virus infection In Asia and Africa. Actually, only 14 cases of human Zika virus infectons have been reported. [1], [6-8]. However, in 2007, a big outbreak of Zika virus was occurred on Yap Island when scientists have observed patients with symptoms clinically different from others arboviral infections such as dengue and chikungunya virus [14]. Interestingly, scientists have demonstrated that Zika virus was transmitted outside Asia and Africa. These results have suggested that zika virus can continue to spread in new area and its infection can occur outside Asia and Africa.

Few years later, a large outbreak of Zika virus was occurred in French Polynesia (in the south pacific) in 2013, when scientists have noted a mild dengue-like illness in three patients aged 42 - 53 years. In fact, a reverse transcription PCR (RT-PCR) were used to detect chikungunya virus , West-Nile virus, DENV and Zika virus, all results were negative for chikungunya virus, West-Nile virus and DENV, whereas the results of RT-PCR for Zika virus were equivocal. Few weeks later, another patient aged 57 year s has showed similar symptoms. Interestingly, the results of RT-PCR for Zika virus were positive. Scientists have confirmed these results by sequencing partial M/E genes of two Zika virus strains [15].

In March 2015, an Italian traveler returning to Italy has also showed Zika virus symptoms after spending the holiday in Salvador de Bahia in Brazil. The serum has been exanimated by scientists using

immunological tests to detect the presence of IgG and IgM antibodies against numerous viral infections including dengue virus (DENV), Zika virus (ZIKV), Parvovirus B19, Japanese encephalitis virus, West Nile virus, Yellow fever virus, as well as human herpes virus 6 (HHV6), and HIV.the Results of the serum tested was positive for ZIKV and negative for all other viruses. [9, 10]

In May 2015, an outbreak of zika virus infection was first reported in Brazil and Americas [11]. Few months later, numerous cases of microcephaly have been reported in Pernambuco state. Unfortunately, the number of microcephaly cases was considerably increased recently as reported by the Brazilian ministry of health [12]. However, It is strongly believed that a correlation exist between Zika virus infection in pregnant women and microcephaly of foetus. Since, numerous scientists were investigated the role of Zika virus infection in pregnancy, but so far, there is no clear evidence to confirm this. [13].

In 2016, several scientists from the Institut Pasteur in French Guiana have sequenced the first complete genomes of zika virus circulating in Americas. Previously, only a small number of zika virus complete genome was available but none of them are from America. Interestingly, phylogenetic analysis of zika virus sequences has showed that Suriname strain was phylogenetically very close to the French Polynesia strain. In addition, the Result obtained has demonstrated that these two trains share more than 99% of genetic similarity which mean that Zika virus spread rapidly and may continue to spread to new areas [16].

Symptoms

Actually, the principal clinical symptoms of zika virus infection consist of low-grade fever (< 38 °C), maculo-papular rash, arthralgia , conjunctival hyperaemia as well as general symptoms such as asthenia and headaches. [17, 18].

zika virus infection symptoms are generally mild and can be misdiagnosed as dengue,chikungunya and many arboviral infections which cause fever and rash . Furthermore, numerous studies have strongly suggested that there is an association between zika virus infection and neurological complications like Guillain - Barré syndrome. However, this finding still under investigations [21, 22].

Transmission

As it is well known, Zika virus is transmitted by Aedes mosquitoes, including several species such as *Aedes. hensilli*, *Aedes. africanus*, *Aedes. Luteocephalus* and *Aedes. Aegypti* [1-4].

Actually, zika virus was first isolated from *Ae. Africanus* , these mosquitoes were the most abundant and widely distributed in Africa as reported by many scientists [5].since, zika virus infection was transmitted outside the African continent . Numerous researches have showed that *Aedes. Aegypti* in addition to its main role in transmission of several tropical fevers, this mosquito was reported as principal vector responsible for zika virus transmission outside Africa [20].

Recently, Wong and co-workers have performed an experiment in order to know if *Ae. Albopictus* can be considered as a potential vector of Zika virus. In fact, this study was based on the fact that *Ae. Albopictus* was able to transmit more than 20 arboviruses. Therefore, scientists have orally infected mosquito with Zika virus. Few days later, Wong and co-workers have determined the transmissibility of zika virus using qRT-PCR. Interestingly, results obtained demonstrated that 73% of mosquitoes infected contain Zika virus in their saliva [19].

DISCUSSION AND CONCLUSION

Zika virus disease is a vector borne disease transmitted by several *Aedes* species. Zika virus infection was transmitted outside Africa by *Aedes Aegypti* mosqueto as reported by many scientists. in fact, *Aedes*

Aegypti is the main vector of many others tropical disease such as yellow fever and dengue virus. Moreover, this mosquito has become the major indirect cause of morbidity and mortality of human in worldwide.

The presence of *Aedes Aegypti* have been reported in western areas of Saudi Arabia; Jeddah, Makkah and Al-Madinah [23, 24]. This finding make Saudi Arabia a potential risk infection area. Furthermore, AL ALI and co-workes have found that increased gene flow among *Aedes aegypti* populations occurs between Africa and Saudi Arabia.(unpublished data). Moreover,Commercial exchange and foreign pilgrims from Zika virus endemic regions, may play critical role in disease transmission.

Until now, there is no vaccine or treatment available to treat patient with Zika virus infection. However, The National Institute of Allergy and Infectious Diseases (NIAID) are currently working on aDNA-based vaccine to prevent ZIKAV infection. Furthermore, the control of the disease depends on control of the vector, thus, further phylogenetic studies are required to gain more insight into the geographical distribution of Zika virus disease.

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