

## ZIKA Virus (ZIKV): Insights in Saudi Arabia

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### ABSTRACT

After the outbreak of MERS, Zika is becoming an epidemic disease and affecting many countries all over the world, till now 31 countries are reported to be ZIKV positive. The main threat is in the American countries, especially Brazil. The ZIKV is from the flavivirus family and spread by the vector *Aedes aegypti* the same mosquito that carries Dengue. The first report in human was reported from Nigeria in 1968 then the outbreak was reported on Yap Island now the recent is reported in Brazil where 440000-1300000 suspected cases of Zika infection are reported. The major threat of ZIKV infection is for the foetus and because of this infection almost 4000 cases of Microcephaly in recently born were reported because of ZIKV pregnant women. The virus is ssRNA virus with Envelop protein, capsid protein and 7 non-structural proteins. The virus can be transmitted by different sources like by mosquito bite, from pregnant women to foetus, by sexual intercourse or blood transfusion. There is no vaccine or medicine to treat Zika although research is going on all over the world till date. Precautions should be taken to avoid the infection until we have some effective vaccine against ZIKV.

In Middle East there is positive case of ZIKV and according to Ministry of Health Saudi Arabia there is no positive case of ZIKV in Saudi Arabia.

Abbreviations: Zika Virus **ZIKV**, Guillain-Barre syndrome **GBS**, World Health Organization **W.H.O**, Single standard RNA **ssRNA**.

**KEY WORDS:** Zika virus (ZIKV), Brazil, Pregnant women, Vaccines, Microcephaly

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### INTRODUCTION

After the deadly outbreak of MERS, Zika seems to be the new threat for the world. Zika virus (ZIKV) is enveloped, single standard RNA virus which can infect mammals like monkey, rodents including humans [1]. The virus is composed of capsid protein (C), Envelop protein (E), seven nonstructural proteins (NS) and a single standard RNA (10794 kb) [2]. The Non-structural proteins have different functions and they are involved in the polymerase, methyl transferase activity, translational and virus crystallization [3]. Transmission of ZIKV is through the vector *Aedes aegyptia* major Arbovirus vector [4] that carries viruses of dengue, yellow fever, Chikungunya, West Nile, and Japanese encephalitis in human and other mammals [5]. ZIKV is non-fatal disease but the consequence of this disease can be dangerous. During mild infection it causes fever, rashes and muscle weakness in adults [6]. The more severe symptoms are Guillain-Barre syndrome and microcephaly in infants [7]. The first report of ZIKAV isolation is from the serum of rhesus monkey in Zika forest during epidemiology research of yellow fever in 1947 and the virus was named as ZIKV. Inhuman ZIKAV was confirmed during the serological studies of a male in Uganda in 1952 [1]. The first case of laboratory infection was reported in 1973 [8]. The first outbreak was reported in Yap Island in Micronesia where 5000 cases were reported and before not more than 14 cases were reported [9]. No case was reported till 2013, but after that 28000 cases were reported in the Pacific [10]. The new target of ZIKAV is US and Territories. In United States total of 388 cases are reported till date and all are travel associated. In US Territories total of 503 are reported and 500 cases are travel associated. In United States, Florida (84), New York (60), Texas (30) are the states with the highest number of cases and all are travel associated. In U.S territory Puerto Rico is at number one with 474 positive cases all of them are locally acquired. Brazil is the most affected country and 440000-1300000 suspected cases of Zika were reported [11].

No further transmission was identified in the Pacific until October 2013, when French Polynesia (FP) reported the first cases; a subsequent explosive outbreak resulted in an estimated 28 000 cases seeking medical care (approximately 11% of the population).

#### Epidemiology:

The first cases Zika infection in human was reported in 1952 in Uganda [1], currently 31 countries are reported to be positive with the ZIKV infection. A few countries with positive ZIKAV cases are Brazil, Barbados, Colombia, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Haiti, Honduras, Martinique, Mexico, Panama, Paraguay, Puerto Rico, Saint Martin, Suriname, and Venezuela [12].

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**Current Status of ZIKV infection in Saudi Arabia:**

There is no positive report of ZIKV infection in Middle East countries but as there are few reports showing the vector of ZIKV in Saudi Arabia until now [13] but during Hajj people from all over the world also from countries with positive ZIKV cases gather in Saudi Arabia so during Hajj chances of transmission of ZIV are high. Ministry of health, Saudi Arabia is strictly monitoring the pilgrims during Hajj and Umrah to prevent the transmission. And to keep on eyes on Zika infection, Ministry of health, Saudi Arabia conducted Zika infection test in 853 pregnant women from different regions of Saudi Arabia but all of them were found negative with ZIKV infection [14].

**Transmission of ZIKV:**

The main source of transmission of ZIKV is *Aedes aegypti*, which is also responsible for some life threatening diseases like dengue, yellow fever and chikunguniya [4]. The female mosquito carries the virus in saliva and when bites human or other animals like monkey transmits the infection.

There are many other course of ZIKAV transmission, one of them is the infected blood donor who can directly transmit the infection to the receiver. The report of donor to receiver transmission was confirmed in French Polynesia, where a specific nucleic acid testing of blood donors was implemented to prevent transmission of ZIKV by blood transfusion and from November 2013 to February 2014, 42 (3%) of 1,505 blood donors were found positive for ZIKV by PCR although asymptomatic at the time of blood donation[15]. In 2016 Brazilian health officials also confirmed the transmission of infection from blood donor to receiver [16].

The other very important source of transmission is pregnant mother who can transmit the ZIKV to her foetus through amniotic fluid. This maternal-foetal transmission causes permanent defect in the foetus brain because ZIKV attacks nerve progenitor cells of foetus and causes defects in neurons cell division which result into microcephaly(a permanent neurological disorders in infant).[7, 1718].

Few reports also confirmed that ZIKV can be transmitted by sexual contact[19].The first case of sexual transmission of ZIKV was reported in French Polynesia in December 2013, during a Zika virus (ZIKV) outbreak. ZIKV was isolated from semen of a patient in Tahiti sought treatment for hematospermia[20].

**Symptoms:**

Symptoms of ZIKV infection vary from mild to severe. In most of the cases ZIKV is asymptomatic. The symptomatic infection is reported only in 18% of the total cases. Mild symptoms include fever, rashes, conjunctivitis [9]. The severe symptoms is Guillain-Barre Syndrome (GBS)in adults [21] and microcephaly in infants [17].

Guillain-Barre Syndrome (GBS) is neurological defect that causes acute a reflexic paralysis and damage of peripheral nervous system. Some reports confirm that the ZIKV infection can cause Gullain Barre Syndrome (GBS)in adults with severe infection [22]. A study in 2016 shows that two patients with GBS had ZIKV infection. Although the mechanism of ZIKV related GRB yet to be identified, but the previous reports indicate, ZIKV can be big threat for adults because infection can cause permanent muscular disorder Guillain-Barr [23].

Microcephaly is the other severe symptom of ZIKV infection. Although the direct effect of ZIKV on infants is not clear. The symptoms of ZIKV in pregnant women are mild which include maculo papular rash, conjunctival infection and lymphadenopathy, but the infection in pregnant woman can be very harmful to her foetus and cause foetal death, placental insufficiency and CNS injury[24].Many reports confirm that prenatal transmission of ZIKV to foetus can cause loss of brain development in infants[11]. 6000 notified suspected cases in Brazil associated with ZIKV were reported [25].

**Diagnosis:**

Laboratory confirmation of diagnosis is made with a reverse-transcription polymerase chain reaction (RT-PCR) of viral RNA or serology both of which are currently only performed at in reference laboratories[26]. However, the RT-PCR has quite limited utility as it is only positive during a narrow window, 3-7 days after the onset of illness, during the period of viremia. Zika virus serologic testing has much greater application in the usual clinical setting, but should not be performed until more than 4 days after onset of disease because detectable amount of antibodies (IgM) appear only by days 3-5 after illness. This test measures IgM and neutralizing antibodies. Because they cross react with dengue antibody, specific dengue serology should also be obtained and compared to results for Zika. Acute and convalescent serum determinations are also quite useful in confirming the diagnosis as the level of antibodies increases during acute infection and decreases to during convalescent. [27].

**Treatment:**

The researchers from The National Institute of Allergy and Infectious Diseases (NIAID) decoded the structure of ZIKV and trying to work on the specific drugs against ZIKV infection, but there is no specific treatment available for ZIKV till date[25].

### Prevention:

There is no permanent treatment for Zika so far so the precaution should be taken to avoid the infection and people should avoid travelling to the countries with ZIKV positive cases. To prevent the infection in new-borns Jamaica advises the females to avoid pregnancy for some time and pregnant women should take extra precautions [28].

According to W.H.O, there are many EPA approved mosquito repellents to prevent mosquito bite. As the infection can be transmitted through sexual intercourse so the use of condoms is advised[29].

The Researchers from The National Institute of Allergy and Infectious Diseases (NIAID) are currently working on a DNA based vaccine to prevent ZIKAV infection and a company from India (Bharat Biotech Ltd) claims to have first vaccine for Zika, but clinical trial should be performed before recommending vaccines to the patients and that is a time taking process [30].

## DISCUSSION

ZIKV infection is confirmed by many countries, Brazil is the most affected country among them. Although the mortality rate is negligible, but in severe infection the effect of ZIKV on new born (microcephaly) and adults (Guillain-Barre syndrome) is permanent. Currently there is no specific medicine or vaccine for ZIKV so it is better to take precautions until we get some permanent solution to treat Zika. ZIKV can be transmitted not only by mosquito, but also via different other routes like sexually and from mother to foetus and from an infected donor to receiver. The number of cases is increasing day by day from one part of the world to another. Middle East countries are free from this infection, but there is a great chance of infection, especially in Saudi Arabia as millions of people gather during Hajj and Umrah also from the countries with ZIKV positive cases. Recently, researchers from Saudi Arabia confirmed the presence of the mosquito *Aedes aegypti* which are responsible for the transmission of ZIKV so there are fair chances of transmission of infection from infected pilgrim. Although the ministry of health, Saudi Arabia is continuously monitoring the pilgrims, but still extra precaution should be taken because a single infection during mass gathering (Hajj) can come up as outbreaks.

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