

REVIEW

ZIKA VIRUS-AN OVERVIEW

ZIKA VIRUS-GENEL BAKIŞ

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ABSTRACT

Zika virus is a flavivirus that spreads to humans by a bite from an infected Aedes mosquito. This infection is usually asymptomatic or presents with mild symptoms in infected individuals. However, if a pregnant lady gets infected with this virus, congenital brain damage associated with microcephaly is manifested in the new born. Zika virus infection has been considered as an emergency outbreak by the WHO and hence immediate safety measures have to be adopted in curbing the disease. The paper presented here provides an overview about the Zika virus.

Keywords; microcephaly, mosquito, outbreak, Zika, virus

Introduction

Zika virus (ZIKV) disease is considered as the most deadly infectious disease emerged in the recent time. ZIKV is a member of Flaviviridae family from the Spondweni group, the same family as yellow fever, dengue, West Nile and Japanese encephalitis viruses ^{1,2}. This disease is a mosquito borne disease, where *Aedes* mosquito is considered as the main vector, and in general cause maculo-papular rashes with mild febrile illness ³. A few outbreaks were documented in tropical Africa and some parts of South East Asia before 2007. Several islands of the Pacific region also experienced certain outbreaks after 2007 ^{4,5}. In 2015, reports of outbreaks were reported in South America also ⁴.

There is no treatment, prophylaxis or vaccine currently available to protect against Zika virus infection. Therefore, only personal preventive measures are advised to avoid mosquito bites during the daytime period.

Epidemiology

In 1947, first known case of Zika fever was identified in sentinel rhesus monkey stationed on a tree platform in the Zika forest in Uganda ⁶. In 1954, first human cases were documented in Nigeria. The serologic evidence of human ZIKV infection was reported from 1951 through 1981 from other African countries such as Uganda, Central African, Egypt Tanzania, Sierra Leone and Gabon ⁷. With further investigations the virus was isolated from the mosquitoes in Côte d'Ivoire, *Ae. aegypti* mosquitoes in Malaysia, and a human in Senegal ^{8,9}. Olson et al in 1981 reported 7 patients with serological evidence of ZIKV disease in Indonesia ¹⁰. In the Yap Islands of the Federated

States of Micronesia, the first major outbreak of the illness with 185 confirmed cases was reported in 2007.

Around 108 cases were confirmed by polymerase chain reaction and the rest additional cases were suspected ¹¹. During the period of 2013 and 2014,

another outbreak was reported in French Polynesia which was thought from an independent introduction of the virus from Asia than the outbreak from Yap Island. Approximately 8750 cases with ZIKV infection were reported in French Polynesia of which 383 cases were confirmed and around 72 cases reported with auto immune disease or neurological symptoms following a disease period having symptoms similar to ZIKV infection ¹². Out of this, 42 cases were confirmed as Guillain-Barre syndrome. But the causative linkage between ZIKV and Guillain-Barre syndrome is still not established ¹³. In May 2015, Brazil documented the first confirmed case of ZIKV infected patient. Till November 2015, 17 states of Brazil had reported endemic transmission of ZIKV ¹⁴. According to Centers for Disease Control, 20 states of Brazil reported 2400 babies born with microcephaly and 29 infants death recorded where ZIKA virus is the suspected cause. The incidence rate of microcephaly, increased ten folds according to the epidemiological survey as of November 2015 ¹⁵. However a causative connection between ZIKV infection during pregnancy and microcephaly in newborns is possible but yet not enough evidence is available to confirm it. On 15th January, 2016 United States CDC, issued an interim Travel Guidance for pregnant women travelling or planning to travel to 14 countries and

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territories with local transmission in Central and South America and the Caribbean. They have been advised to avoid travelling to those countries where endemic transmission is evident and if travelling cannot be avoided they have to take adequate measures to ensure enough protections from mosquito bites¹⁶.

Transmission

ZIKV has been isolated from various species of *Aedes* mosquitoes such as *Ae. aegypti*, *Ae. africanus*, *Ae. luteocephalus*, *Ae. apicoargenteus*, *Ae. furcifer* and *Ae. vitattus* mosquitoes^{6,17,18}.

During the outbreak in Yap Islands in 2007, the predominant mosquito species present was *Ae. hensilii*, however researchers were unable to detect ZIKV in any mosquito on the island during that time¹¹. Through several investigations, Boorman et al demonstrated transmission of the virus to monkeys and mice through *Ae. aegypti* in a laboratory set up. According to their study the extrinsic incubation period of ZIKV in mosquitoes is around 10 days¹⁹. Till date there is no concrete evidence of non primate reservoirs of ZIKV, but only one study demonstrated antibody to ZIKV in rodents²⁰.

The first case of perinatal transfusion of ZIKV was suspected in French Polynesia where the newborn showed maculopapular rashes after birth and the mother gave a history of ZIKV infection like syndrome two weeks before. However, various laboratory investigations were not prosecuted²¹.

Increased risk of transfusion – transmitted ZIKV infection and perinatal transmission has been documented in literature²². The reports of transmission of ZIKV virus even by sexual intercourse was suggested by Foy et al. in 2008 in a patient in the southeastern region of Senegal²³.

Clinical features

In 1964, Simpson elaborated his own occupationally acquired ZIKV illness at the age of 28 years which is considered as the first well recorded report of human ZIKV disease. Initially he experienced mild headache followed by maculo papular rashes the next day over his face, neck, trunk, and upper arms which slowly spread to his palms and soles. Later on, transient stage of fever, uneasiness, and back pain developed. On the second day evening of illness the rash was fading and he was in an afebrile state. On the third he had only rashes with no other uneasiness or pain. And eventually the rashes disappeared in the next two days.

Around 80 % of the infected cases were found to be asymptomatic. The symptomatic disease is generally manifested in a milder form and is characterized by an acute onset of fever, maculo papular rashes, non-purulent conjunctivitis or arthralgia. The other manifestations comprise dizziness, anorexia, constipation, diarrhea and abdominal pain. In symptomatic patients, incubation period is around three to seven days²⁴. According to a report by European centre for disease prevention and control in November 2015, microcephaly have been linked potentially to endemic spread of Zika virus in Brazil²⁵. However further

investigation and studies are required to confirm the causative link between Zika virus and microcephaly.

The clinical manifestations in immunosuppressed patients has not been evaluated or documented till date and it is not known whether there are groups of individuals at particular risk of complications. Death in a sickle cell patient infected with ZIKV has been reported²⁶.

Diagnosis

In order to detect the viral RNA in the acute phase in serum samples of infected individuals, diagnostic test such as PCR

test are used. At the Arboviral Diagnostic and Reference Laboratory of the Centers for Disease Control and Prevention (Atlanta, GA, USA) an ELISA test has been developed to identify immunoglobulin (Ig) M to ZIKV¹. Commercially, no kits or tests are available to detect the Zika virus antibodies or nucleic acid.

ZIKV RNA can be detected in the serum of the infected individual during the first week of illness after the onset of symptoms. At the end of the first week, neutralizing antibodies and virus-specific IgM typically develops; cross-reaction with other related flavi-viruses such as dengue and yellow fever viruses is quite common and can propound a diagnostic challenge for the investigators²⁷. The ZIKV can be isolated from the saliva in acute phases of the illness and is more useful in case of children and neonates where collection of blood becomes difficult²⁸.

Treatment

Currently, no specific antiviral or vaccine is available as a curative measure of ZIKV infection. The treatment is only supportive and symptomatic. Adequate rest and increased fluid intake is recommended to avoid dehydration. Acetaminophen or paracetamol can be recommended to relieve fever and pain. Aspirin and non steroidal anti inflammatory drugs such as Ibuprofen should be avoided until dengue is ruled out in order to avoid hemorrhage²⁹.

Precautions

Control over vector borne diseases such as chikungunya, dengue, Zika and other arbovirus, can be achieved by insect bite precautions and vector control measures³⁰. Recently various guidelines has been issued by US Centers for Disease Control and Prevention, the European Centre for Disease Prevention and Control and other health agencies all over the world to provide guidelines for ensuring the preventive measures against ZIKV for its citizens^{31,32}.

Travellers travelling to affected regions have been advised to take basic precautions such as using full cover up clothing, using mosquito nets and insect repellent to protect themselves against *Aedes* mosquitoes which bite generally during the day time³³. With the increased concern about infection during pregnancy being the causative reason for microcephaly and congenital brain damage, Public Health England advises pregnant travellers to avoid travelling to regions where Zika transmissions are reported. It also advises female travellers who visited endemic regions to

avoid becoming pregnant for further 28 days from the time of returning to their country³³.

Conclusion

As ZIKV outbreak has been recently considered as an emergency declared by the WHO, necessary precautionary measures have to be taken to prevent the same. The overall goal for prevention should be to reduce the risk of exposure to Zika virus infection. Also adequate research must be undertaken at the earliest to develop pre-exposure and post-exposure prophylactic agents to prevent the spread and complications of the disease.

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