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A REVIEW ON ZIKA VIRUS

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ABSTRACT

Zika, is a flavivirus mainly transmitted by mosquitos of Aedes genus, it was discovered in 1947 in Uganda. The World population is facing different health problems from zika virus and it's vector. A pregnant woman can pass zika virus to her fetus during pregnancy it may causes microencephaly and also other brain deformities in fetus. In adults zika virus infections are characterized by subclinical or mild influenza-like illness, it also causes severe manifestations including Guillain-Barre syndrome. Its spread to various countries has led to a global health emergency. Fast dissemination of this virus in different geographical areas posses a major threat especially to regions where the population lacks herd immunity against the ZiV and there is abundance of Aedes mosquitoes. There are no effective vaccines or treatment is available till now. The main focus of this review is to summarize current global scenario, epidemiology, pathophysiology, diagnosis and remedial measures for ZiV considering the Indian perspective.

KEYWORD: Zika virus, Mosquito-borne infections, flavi virus.

1. INTRODUCTION

Virus is smaller than a bacterium and comes under microorganism. They are the smallest microorganism responsible for various human infections, they are in different sizes ranging from approximately by 20 to 300nm in diameter. They contain either RNA or DNA as their entire genome.[1] Zika virus (ZIKV) is a member of the virus group-iv (+) ssRNA family *Flaviviridae*. It is spread by *Aedes* mosquitoes which are generally active in daytime, such as *A. aegypti* and *A. albopictus*. It is firstly identified in the Zika Forest of Uganda from here its name comes Zika.[3] Zika virus is related to the dengue, yellow fever, Japanese encephalitis, and West Nileviruses.[4] Zika virus infection, known as Zika fever or Zika virus disease, often

causes no or only mild symptoms, similar to a very mild form of dengue fever.[5] Zika can also spread from a pregnant woman to her fetus.It can causes abnormal decrease in brain size (microcephaly), brain malformations, and other birth defects.[4] Zika infections in adults may result rarely in Guillain–Barrésyndrome, like dengue (DEN) and chikungunya (CHIK) viruses Zika virus infection is also a mosquito-borne illness. Zika virus is enveloped and icosahedral and has a non segmented, single-stranded, 10 kilo bp-sense RNA genome.[5] It is closely related to the Spondweni virus and is one of the two known viruses in the Spondweni virus clade.[3]

2. EPIDEMIOLOGY

Zika virus is a flavi virus that was first isolated in 1947 from a febrile rhesus macaque monkey in the Zika Forest of Uganda and later identified in the same forest *from Aedesafricanus* mosquitoes.[7] The virus was later named as ZiV due to its origin in Zikaforest. Zika fever similar to dengue fever, the ZiV outbreak in French Polynesia presented with highly unusual clusters of Guillain-Barré syndrome.[6]

The first large outbreak of Zika virus infection was reported in the Island of Yap in 2007. In 2013-14 outbreak, French Polynesia, Guillain-Barré syndrome which is a neurological disorder was linked to Zika infection.

Till now only one report is available on the possible presence of ZiV in the Indian subcontinent according to this report detection of antibodies against ZiV (16.8% prevalence) observed mostly in the Bharuch district Bombay State, and in Gujarat and Nagpur in 1954, which could be a result of cross-reactivity with other flaviviruses such as dengue which was widespread in these areas.[8] The major concern is that, once indigenous is established, ZiV can exist in its natural eco-cycle for a significant period with a potential to emerge as a disease causing agent. in March 2015, Zika virus was identified in the Americas when an outbreak[9] suspected cases of Zika virus had been reported in that 37 country. By March 2016, the virus had spread to 33 countries and territories in the Americas.[11]

3. PATHOGENESIS AND CLINICAL MANIFESTATION

Zika virus is transmitted by an arthropod: the aedes mosquito, including Aedesaegypti, Aedes African. Zika virus is well adapted to grow in various host, ranging from arthropods to vertebrates. Viral attachment to cellular receptor is mediated by envelop.[8] Most of the flavi virus replication is thought to occur in cellular cytoplasm but perhaps it might not be the case

with the ZiV. As one of the studies observed that antigens in infected cell nuclei.[12] ZiV can be detected as early as onset of the illness begins and even after 11 days of onset of illness in human.

Blood. Other manifestations include.

- ✓ Diarrhoea,
- ✓ Constipation,
- ✓ Abdominal pain,
- ✓ Anorexia (a medical condition in which appetite is lost),
- ✓ Dizziness.
- ✓ Conjunctivitis (inflammation of conjunctiva).[13]

3.1 The zika virus

ZiV is transmitted by arthropod vectors thus called Arbovirus. It comes under the genus *Flavivirus* and is mostly related to yellow fever, Japanese encephalitis, dengue, and West Nile viruses. It is an enveloped virus, having icosahedral symmetry in head and has a non-segmented, single stranded, positive sense RNA nucleic acid as a genetic material containing 10,794 nucleotides which encodes total 3,419 amino acids.[10]

3.2 Transmission Pattern

Transmission cycle of ZiV in humans occur during outburst, which are rare events where arboviruses become established as a cause of human disease, spread in a mosquito human-mosquito cycle, instead of enzootic mosquito-monkey-mosquito cycle.[9] ZiV is transmitted by *Aedes* mosquitoes, which are daytime active and aggressive biters. The virus has been isolated from *Ae. aegypti*, *Ae.albopictus Ae.africanus .Ae.apicoargenteus*, *Ae. furcifer*, *Ae. hensilli*, *Ae. Luteocephalus s*and *Ae. Vitattuss* having incubation period of about 10-11 days.[14]

3.3 Mosquito-borne Transmission

In Africa, Zika virus exists in a sylvatic transmission cycle involving nonhuman primates and forest-dwellin species of aedes mosquitoes. Rusis transmitted in a mosquito–human transmission cycle.[15] In urban and suburban enviorment zika virus is transmission cycle .Two species in the stegomyia subgenus of ades aegypti and albopictius have been linked with all know zikaVirus.[10] despite the associate of *A. aegypti* and albopictius with outbreaks both were found to have unexpetbly low but similarly vactor competence for the asian

genotype zika virus strain, as determine by a low proportion of infected mosquito with infection saliva after ingestion of an infected blood meal.[16]

3.4 Nonmosquito Transmission

Zika virus can be transmitted from the mother to the fetus during pregnancy. Zika virus RNA has been identified in the amniotic fluid of mothers whose foetuses had cerebral abnormalities detected by ultrasonography, and viral antigen and RNA have been identified in the brain tissue and placentas of children who were born with microcephaly and died soon after birth as well as in tissues from miscarriages.[16] Two cases of peripartum transmission of Zika virus have been reported among mother–infantpairs.[17] Zika virus RNA was detected in bothinfants; one infant had a mild rash illness and thrombocytopenia, whereas the other was asymptomatic.[14]

3.5 Symptoms:

The symptoms are usually characterized

- Sudden onset of fever with rash,
- Joint pain,
- Conjunctivitis (pink eye),
- May include muscle aches and headache.
- Until recently, illnesses from ZIKV have been classified as clinically mild with symptoms lasting several days to a week.
- Oedema of the extremities, retro-orbital pain, anorexia, photophobia, gastro-intestinal disorders, sore throat, cough, aphtous ulcers, back pain, sweating and lymphadenopathies.[16]

4. DIAGNOSIS

The symptoms of ZiV are very much similar to dengue and chikungunya; therefore, the diagnostic molecular techniques are employed on the acute samples and serological tests are applied on samples 5-6 days. After onset of symptoms the diagnostic molecular techniques are performed on acute samples.[6] An alternative to the RT-PCR is the “pan flavivirus” amplification technique combined with sequencing data. Real time RT-PCR can also be very useful for diagnostic, purpose.[8]

- ✓ Several methods can be used for diagnosis, such as Viral nucleic acid detection,
- ✓ Virus isolation,
- ✓ Serological testing

Diagnosis by serology can be difficult as the virus can cross react with other flaviviruse.[7] Virus isolation from samples collected upto five days after the onset of symptoms can be beneficial.

The plaque reduction neutralization test (PRNT) by neutralizing antibody that appears as early as five days after onset of illness has greater specificity with respect to immunoassays, but the drawback is that it may give cross-reactive results in case of secondary flavivirus infections. Immunoglobulin M to ZiV can be detected as early as three days after onset of illness by ELISA.[8] Zika virus can be tested in following samples; blood, saliva and urine. Mostly blood tests are performed. Following tests can be used for detection:

PCR test

It is useful in the first 3-5 days after the onset of symptoms. It helps in the direct detection of Zika virus RNA or specific viral antigens in clinical specimens.

4.2 Serology Test

It detects the presence of antibodies but are useful only after five days. The clinicians should keep a high degree of suspicion of Zika infection in those people who present with its symptoms and have history of travel in the areaswhichhave reported to be effected with Zika virus in the last twoweeks.[6]

5. MANAGEMENT

Presently there is no vaccine or antiviral drug available to combat the ZiV infection. Symptomatic treatment involves supporting care & rest and paracetamol to relieve fever and pain, patient should not take aspirin or other non-steroidal Anti-inflammatory drugs may aggravate bleeding associated with some form of dengue.[16]

Prevention and control relies on controlling mosquito population through effective removal of breeding sites and also reducing mosquito-human interactions.

The other measures include use of insect repellent, use of physical barriers such as screens, sleeping under mosquito nets, wearing clothes that cover maximum parts of the body.[15]

Travellers and tourists should take the basic precautions to protect themselves from mosquito bites. Women must strictly follow individual protective measures to prevent mosquito bites like use of electronic mosquito repellents, mosquito repellent creams, and use of bed nets and

dress that covers most of the body parts. No Zika virus vaccine exists Thus prevention and control measures center on avoiding mosquito bites, reducing sexual transmission, and controlling the mosquito vector.[8]

6. CONCLUSION

Though the presence of Zika virus has not been detected yet in India and serious mortality and morbidity is also not associated with this virus but the possible association of this virus infection with microcephaly and other neurological symptoms is revealed.

This disease has been notified recently internationally and requires very rigorous surveillance programme. With increase in global travel, India is one of the countries to which ZIK virus may spread. One needs to be therefore prepared for dealing with this agent. This article is one such small attempt to create a general awareness regarding ZiV.

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