



A Comprehensive Updates on Zika Virus

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Abstract

Most Aedes mosquitoes are responsible for Zika virus infected disease. Most people are suffering from Zika virus which persist skin rashes, mild fever, conjunctivitis, joint and muscle pain and other peripheral complications. Eventually, these symptoms predominance last for two to seven days. Avoiding mosquito's bites are the best possible way to avoid this infection. The virus shows it bitter tooth on partial tropical parts of the Americas, Africa, Pacific, tropical parts of Asia. Indian vaccine company, Bharat Biotech makes us proud by developing world first Zika vaccine ZIKAVAC[®].

Keywords

Zika virus; Microcephaly; CDS

Introduction

During 1947 in Uganda the devastated Zika virus (ZIKV) originated. This virus transmitted by mosquitos. In further decades, it has its widespread impression on the various parts of the sub-Sahara Africa and south East Asia. In yap Island first major human outbreak was reported during 2007, Micronesia reported 99 cases on her account during this period. Aedes mosquitoes acting as a vector for Zika -Flavivirus, which bits during dawn and late afternoon. Zika infections cause mild illness and moderate fever. In South America, the first reported locally transmitted infections comes from Brazil in May 2015, It was assumed that like widespread occurs during Soccer world cup held in Brazil during 2014. In May and July month of 2015 [1], Brazil reported a maximum number of patients suffering from Zika infections and its associated diseases such as Guillain-Barre Syndrome (GBS) [2] and Microcephaly [3]. In February 2016, as infections moved vividly through the range occupied by the Aedes Mosquitoes in tropical regions of America. Due to its rapid proliferations, WHO (Word Health Organization) considered Zika an infectious disease, and its associated complications as havoc to society and promptly constituted Public Health Emergency of International Concern (PHEIC) for research and investigation purpose. During February 2016, it was concluded that Zika virus infections transmitted worldwide by travelling and also with sexual contacts [4].

Symptoms of Zika Virus Infections

The basic challenges to diagnose Zika infection in starting is a difficult task as it is cognatic with dengue infection. It was primarily reported that *Aedes aegypti*, *Aedes albopictus* mosquitoes are the main messengers of Zika virus.

Zika infection symptoms were quite common, but quick diagnosis needs good clinical practice.

The various symptoms were:

- Low to moderate fever, temperature in between 37.8-38.5°C.
- Moderate joints pain, as especially in the feet and hand causes Arthralgia, sometimes swollen joint were also reported.
- Retroocular headaches and Myalgia
- Conjunctivitis
- Cutaneous maculopapular rash
- Myalgia
- Post -infection maculopapular rash
- Sometimes digestive problems like abdominal pain, diarrhoea, constipations, mucous membrane ulcerations (aphthae) and pruritus.

Diagnosis Zika infection is a typical task as asymptomatic rashes and measles are very common with other diseases, hence traveling and personal history is crucial for diagnosis Zika infections [5].

Zika virus disease and its predominant complications

Potential auto-immune complications with the neurological disorder were observed in Zika virus infection. Brazil is the worst sufferer of Zika infections, as the new report revealed that Guillain-Barre Syndrome (GBS) and Microcephaly were witnessed in northern Brazil increasingly.

Guillain-Barre Syndrome (GBS)

GBS is often considered to be synonymous with acute inflammatory demyelinating polyradiculoneuropathy (AIDP), it is a rapid-onset muscle weakness caused by the immune system damaging the peripheral nervous system. Many experiences change in sensation or develop pain, followed by muscle weakness beginning in the feet and hands. Some associated problems are immune-mediated polyneuropathy, antecedent infections. The diagnosis of this disease is based on pre-clinical data analysis, cerebrospinal fluid analysis and Electro diagnostic testing. During late July 2015, Brazil witnessed a consistent increase in GBS patient who has the Zika virus infection. Mostly the state of Bahia in Brazil these infections were recorded more. Studies also revealed that out of 76 neuroglial syndromes 42 (55%) was suffering from GBS, and within that 5 % 26 (62%) had the Zika virus infection.

The Aggeu Magalhaes Research centre published a report on November 25th in 2015 confirming that 10 Zika virus infections was reported out of 224 possible dengue patients. Out of 10 patients, 7 were reported with GBM or with neurological disorders.

EI Salvador reported on January 2016 with the drastic increase of GBS camper in December 2015. On an average EI Salvador documented 14 cases of GBS every month and precisely 169 cases every year. Statistically, it was shocking that from December 2015 to January 2016 list 46 GBS recorded, and among them, 2 patients died. Mostly all 44 patients were hospitalized and treated with an

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immunoglobulin or with plasmapheresis. One of the deceased patients had a history of multiple chronic diseases. Out of the remaining patients, 22 of them had a bunch of information, remaining 12 (54%) witnessed febrile rash illness within seven and fifteen days prior to the initiation of GBS. GBS has grown to include axonal variants and more restricted variants such as Miller Fisher syndrome (MFS).

Since GBS is an autoimmune disease, the treatment is based on immune therapy, such as intravenous immunoglobulin and plasma exchange. Sometimes corticosteroids help with the long term outcome. The main objectives of plasma exchange are to plasma exchange is for the removal of antibodies in the main bloodstream, which is replaced by artificial plasma, frequently albumin. This treatment is most effective during initiation of the disease during seven to fourteen days from the initiation of the disease. Even though we have sophisticated modern medical care, approximately 5% of the patients GBS dies from the complication such as pulmonary embolism, sepsis or unprecedented cardiac arrest [6].

Microcephaly

Microcephaly is a disorder which alters the neurodevelopment in infants. During microcephaly infected infant, head circumference (HC) appeared more than two standard deviations below the mean for sex and age. Microcephaly may be a presence from birth or it may aggressive in the initial some years of life. In one research 2015, Brazil Ministry of Health (MoH) reported RNA of Zika virus in some pregnant women amniotic fluid. In a further development, it was found that infected mother, fetus diagnosed with microcephaly by using prenatal ultrasound. It was further reported that 35 infants were born August-October 2015 has microcephaly, it was also reported that the mother was visited Zika infected area during their trimester. Among 35, 25(71%) reported savior microcephaly and remaining 17(49%) had some kind of neurological abnormalities. All the infants had a lumber puncher and cerebrospinal fluid was sent for analysis. On mid-November 2015 both MoH and Pan American Health Organization (PAHO), issued an alert on their website concerning the identification of Zika virus RNA by reverse transcription-polymerase chain reaction (RT-PCR) in amniotic fluid samples of former two pregnant women. It was also reported that the Zika virus RNA from multiple body tissues, including in brain cells of the infant who died during neonatal period due to microcephaly. In post birth condition microcephaly severely affects the formation of the normal brain. The patients suffer from microcephaly observed intellectual defects, cerebral palsy. In congenital infection cases, it hindered chromosomal deformations. Abraded increase of microcephaly infected infants indicates it can be transformed into sex or congenital infections [7].

Zika and Pregnancy

We are trying to give an informative outcome in this context, as the Zika virus mostly affecting pregnant women. Zika can be passing through the mother's body to her fetus. It is very important to have a routine check-up with a local health care, personal, if she travelled Zika infected area even though she might feel good on her account. For the benefit of doctors, CDC clearly mentioned in their respective guideline about the treatment procedure for Zika infected women. CDC also insists all pregnant women talk and discuss all health issues with respective doctors if she had a visit recently in Zika infected area. If she is suffering from fever, keen pain, rash or flushing in the eyes, during a stay in Zika infected an area or developed same complications after two weeks of travel in Zika infected area, she must go for a comprehensive health check-up. If she has persistent keen,

pain, red eyes, joint pain, fever during her travel to Zika outbreak area or developed the same complications after two weeks of post travel, she must have to visit a qualified doctor who is practicing in Zika virus infection as per Centres for Disease Control and Prevention (CDC) guidelines. Brazil is the worst suffer in Zika infection since May 2015. The government of Brazil officiated that during Zika infection, the number of birth of babies with congenital microcephaly increased during this period. Due to congenital microcephaly, the fetus brain size shall remain immature and underdeveloped. The Pan American Health Organization, Health authorities in Brazil and CDC jointly working together to find out the preamble relationship between microcephaly and Zika virus. More accurate and target specific laboratory studies were needed to find the relationship between Zika virus and microcephaly. Most importantly pregnant women should avoid mosquito's bits. Pregnancy is very critical time for some women, as the fetus usually develops its vital organs. Exposing herself to toxins, maternal infections, the genetic disorder could be many reasons behind to developed microcephaly in the fetus. Recently so many epidemiologic and laboratory studies performed to find a good correlation between Zika infections and microcephaly. As, for example a public report published by MMWR on 10th of February 2016 proving that the RNA of Zika virus detected in the brain of infants who had microcephaly and presence of Zika virus in the placental fluid of a pregnant woman. Some other speculations suggesting that one kind of pesticides called pyriproxyfen could be the reason behind microcephaly. Retreating the same cause, on 3rd February 2016 a physician group of Argentina showing concerned about the elevated level of pyriproxyfen in drinking water in Brazil. Another report nullifies the former agenda as pyriproxyfen was approved by WHO for mosquito's repellents. In Brazil pyriproxyfen used as pesticides for a decade and cannot be accused of microcephaly [1,7,8].

Clinical observation in Zika infection

Mostly Zika infections resemble like Influenza and sometimes very similar to Chikungunya and Dengue. Apart from this certain common complications are febrile illness, headache, myalgia, vomiting, and arthralgia. The recent breakthrough of Zika infection teaches us one lesson that the Zika virus is no longer self-limiting, however, it is not causing thrombocytopenia and *Hema aspermia* and plasma rupturing. Sometimes Zika infection associated congenital infection, Guillain-Barre syndrome (GBS) can be life threatening. Recent studies also revealed that the Zika infected children are also suffering from retinal and ocular abnormalities.

Development of Zika infection in research point of view

Past animal studies suggesting that the Zika virus develops a cell called tropism in host brain cells. In 1947, George Dick and his friend's isolated Zika strain called MR 766 from a six-week-old mouse which is pre-infected with Zika virus. Further, this strain cell was inoculated in febrile sentinel rhesus macaque using the intracerebral route. After this inoculation host, mice of different ages suffered from motor weakness, paralysis [9]. Same way Zika infection causes in utero in the human fetus. It was also observed that spinal cord faces damage due to Wallerian degeneration. But it is also true that Zika infection does not have any influence on kidney, liver, spleen. In most research it was found that Zika virus Strains are having one N-linked Glycosylation site, which is associated with N154 protein. This N-linked Glycosylation sites are responsible for mosquito-transmitted Flaviviruses infection-Zika. But it remains a mystery that whether differential Glycosylation between Zika viruses enhances pathogenic activity.

Transmission

The mosquito goons, as especially *Aedes aegypti*, which are mainly palpable in some tropical regions such as India, Brazil, and South Africa is responsible for Zika virus transmission. These mosquitoes are also responsible for yellow fever, Chikungunya and dengue. On the other hand sexual transmission of Zika virus becoming a new challenge, as two tangible cases reported which confirmed the presence of Zika virus in semen.

Diagnosis

Infected person's urine, blood, saliva, plasma samples to be analyzed if the person is suspected of Zika virus infection. Zika virus studies can be carried out by PCR technique where RNA of the Infected Zika virus to be detected.

Prevention

- Preventing mosquito bites by dressing in loose clothes and during sleep, using mosquito net is the best way to prevent.
- Mosquitorepellent such as DEET (N,N-diethyl-3-methylbenzamide), IR3535 (3-[N-acetyl-N-butyl]-amino propionic acid ethyl ester) or icaridin (1-piperidinecarboxylic acid, 2-(2-hydroxyethyl)-1-methylpropylester) is the best alternative.

Treatment

Since Zika is a new atypical disease and very much similar with dengue and chikungunya, similar care to be given to the patient who suffers from Zika virus infection. Consumption of plenty of fluids with solid rest can be a good option for tackling infection. If the situation keeps deteriorating then immediate consult with a doctor is needed. Till date, there is no FDA-approved vaccine available in the market.

Testing

A Recommended tests: Plenty of tastings are available such as Reverse transcriptase polymer chain reaction (RT-PCR) to find Zika virus RNA, Immunoglobulin enzyme reaction, neutralizing antibody reaction, Dengue virus IgM estimation

B Clinical specimens: It is possible to detect virus from the serum of umbilical cord, Cerebrospinal fluid also a promising candidate for clinical studies [10].

World First Zika Vaccine (ZIKAVAC®) Introduce by India

Bharat Biotech an Indian based vaccine manufacturing company finally shown some ray of hope by introducing Zika vaccine as ZIKAVAC® on 7/02/2016 (Figure 1). This Hyderabad-based company developed one recombinant and another inactivated vaccine and submitted to the government of India. But the pre-clinical studies for the vaccines are in under constant monitoring. Once its get approved then further proceedings for regulatory filing will be commenced. By using heat, chemical and radiation killing the microbes are comes under inactivated vaccines, on the other hand by using recombinant technology inserting the DNA encoded with antigen E.g. Bacterial surface protein, that actually accelerate immune response, Corsetry: The Hindu-08.02.2016) [11].

Conclusion

The humanity fights against the Zika virus are just beginning, still lots of scientific research is yet to come. Prevention of conceived

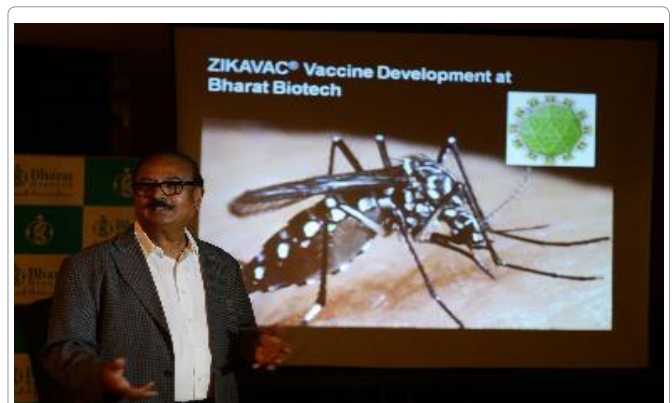


Figure 1: Dr Krishna Ella, Chairman and Managing Director of Bharat Biotech introducing ZIKAVAC® To the world.

mother from getting infected with Zika virus would be more enforceable as it is affecting our upcoming breeds. WHO should take some strong scientific research and excavations to prevent this disease from becoming more pandemic.

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