

Review Article

Zika virus infection: a public health emergency!

Muhammad Salman Haider Qureshi^{1*}, Bakhtawar Wajeaha Qureshi², Ramsha Khan³

¹Institute of Public Health and Social Sciences, ²Institute of Physical Medicine and Rehabilitation, Khyber Medical University, Peshawar Pakistan

³College of Nursing and Healthcare, University of West London, United Kingdom

Received: 10 January 2017

Accepted: 06 February 2017

*Correspondence:

Dr. Muhammad Salman Haider Qureshi

E-mail: pmc.salmanqureshi@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Zika virus belongs to the family of Flaviviridae. The Flaviviridae family also includes other human pathogens like *West Nile virus* (WNV), *Yellow fever virus* (YFV), mosquito transmitted *Dengue virus* (DENV), *Tick borne encephalitic virus* (TBEV) and *Japanese encephalitis virus* (JEV). *Zika virus* is a mosquito-borne disease and is transmitted by *Aedes aegypti* mosquito.

Keywords: *Zika virus*, WHO, Public health

INTRODUCTION

Zika virus was first discovered in 1947 in Rhesus monkey in the forest of Uganda known by the name of Zika forest.¹ *Zika virus* belongs to the family of Flaviviridae. The Flaviviridae family also includes other human pathogens like *West Nile virus* (WNV), *Yellow fever virus* (YFV), mosquito transmitted *Dengue virus* (DENV), *Tick borne encephalitic virus* (TBEV) and *Japanese encephalitis virus* (JEV).² *Zika virus* is a mosquito-borne disease and is transmitted by *Aedes aegypti* mosquito.³ Soon after its discovery in sentinel rhesus monkey, the virus was then isolated from *Aedes* mosquito in 1948 and then in 1952, the virus was isolated from humans.^{4,5}

The first case of human infected with *Zika virus* was reported in 1952 in Uganda.³ The first epidemic was reported in Micronesia in 2007. In this epidemic almost 75% of Micronesian population got infected.⁶ An official warning was announced by The Pan American Health Organization (PAHO) after confirming the human case infected with *Zika virus* in Brazil.

Since the first *Zika virus* disease reported in Brazil, sporadic cases have also been reported in different areas

of Sub-Saharan Africa and South-east Asia.⁷ Major epidemics of *Zika virus* infection have also been reported in Cook Islands, French Polynesia, Easter Island and New Caledonia.⁸ *Zika virus* disease has also caused epidemic in Oceania in 2013.⁵

A dramatic increase in the number of human cases infected with *Zika virus* was noticed in Americas in 2015.⁹ On February 2016, *Zika virus* infection was declared as a public health emergency of international concern by World Health Organization.¹⁰

SIGNS AND SYMPTOMS

The signs and symptoms of *Zika virus* infection includes maculopapular rash on skin, arthralgia, sudden onset of fever, myalgia, asthenia, malaise, conjunctivitis and headache. The symptoms of *Zika virus* infection often mimic dengue and infections of other arboviruses like chikungunya.³ Other symptoms of *Zika virus* infection that are reported less commonly include vomiting, abdominal pain, retro-orbital pain, diarrhea and anorexia.⁷

After 3-12 days of bite by mosquito infected with *Zika virus*, symptoms start appearing which are usually mild

and can last for almost 2-7 days.³ Astonishingly, almost 80% people having *Zika virus* disease can remain totally asymptomatic because of the self-limiting and mild nature of infection. The good thing is that so far not even a single case of severe form of this disease has been reported and thus it is not regarded to be a fatal disease.¹¹

LABORATORY TESTING AND DIAGNOSIS

The first reported case was investigated by reverse transcriptase polymerase chain reaction (RT-PCR) of serum collected from patients in region of Bahia presenting with dengue fever like signs and symptoms including fever, conjunctivitis, rash, arthralgia and myalgia.¹²

For the diagnosis of infection, usually the blood sample of suspected patient is required for reverse transcriptase – polymerase chain reaction (RT-PCR).¹³ The *Zika virus* remains detectable in blood during the acute phase of viremia and appearance of initial signs and symptoms but later on it is shed in patient's urine ranging from 3 to 15 days.¹⁴

Due to the limited availability of RT-PCR in Brazil, majority of the cases are usually diagnosed on clinical basis. The presence of *Zika virus* has also been confirmed in patient's saliva, urine and serum. As per the recommendation, within first 5 days of onset of symptoms, the serum samples are required to be collected but diagnosis by serology is difficult because of the cross-reaction of *Zika virus* with other virus such as Chikungunya and Dengue.³

All those individuals who discover at least 2 or more primary symptoms with 2 weeks of living in vulnerable areas with previous history *Zika virus* inhabitation must be investigated for the presence of *Zika virus*. Women having recent history of travelling to susceptible areas at any time during their pregnancy should also volunteer for test. Similarly mothers of infants having less than third percentile of occipito-frontal circumference on growth charts should also be tested for presence of *Zika virus* infection.¹⁵

DIAGNOSTIC RECOMMENDATIONS FOR PREGNANT WOMEN

The pregnant women can be investigated by RT-PCR using blood samples during the first week *Zika virus* illness. The amniotic fluid in gestational sac can also be used for RT-PCR, however the sensitivity and specificity of this for congenital infections is still unknown. However those pregnant women who are asymptomatic need not to undergo RT-PCR in the absence of travel history to area known for presence of *Zika virus* or birth history of intra-cranial calcification or microcephaly.³

As per the recommendations, serology is not appropriate for investigating pregnant women suspected for having

Zika virus disease due to the decreased reliability of serology because of probable cross-reaction between *Zika virus* with other viruses. *Zika virus* has not only been isolated from the amniotic fluid of mothers of micro cephalic babies but also from the brain of fetus having neural abnormalities.¹⁶⁻¹⁸

TREATMENT OF ZIKA VIRUS DISEASE

No anti-viral drug or vaccine has been approved so far to treat *Zika virus* infection. However the patients infected with *Zika virus* are treated symptomatically. Aspirin should not be given until and unless dengue fever is ruled out, however Paracetamol can be given to treat arthralgia and fever.³ As there is no approved drug and vaccine preventing mosquito bites and taking precautionary measures regarding travelling can help in preventing *Zika virus* infection.

SEXUAL TRANSMISSION OF ZIKA VIRUS DISEASE

Zika virus can also transmit by sexual route and can also transmit vertically.¹⁹⁻²¹ In recent cohort studies, it was difficult to establish evidence of sexual transmission of *Zika virus* from a male partner to pregnant women due to the co-habitation of both the couple and presence of almost same environment for vector exposure however, it was observed that women infected with *Zika virus* was having a frequent history of symptomatic male partner as compared to the uninfected women but again there remains a possibility of less exposure of *Zika virus* to the uninfected couples.¹⁴

ZIKV-positive women more frequently had a history of a symptomatic partner than did ZIKV-negative women; however, this could also be due to less exposure to the vector among uninfected couples.

ASSOCIATION OF ZIKA VIRUS WITH CONGENITAL MALFORMATION AND NEUROLOGIC DISEASES; A MYTH OR REALITY?

Zika virus has found to be associated with microcephaly. Since the *Zika virus* infection was reported in Brazil, an annual increase of almost 20 times microcephaly cases were observed. More than thousand suspected cases were reported in the year 2015 alone.²¹ The concerned officials of ministry of health in Brazil affirmed the association of microcephaly and *Zika virus* and soon after that World Health Organization released an emergency alert regarding the relation of *Zika virus* and congenital malformation.²²

However it has not yet been experimentally proven that *Zika virus* causes microcephaly and even if it causes then the question is that whether it is as a result of direct effect of *Zika virus* or due to the exposure developing fetus to teratogens.²³

Although *Zika virus* disease is self-limiting but still the cases of Guillain barre syndrome and other neurologic diseases have already been reported in Brazil and French polynesia.¹¹ *Zika virus* has also been reported to cause paralysis in infected individuals.⁵

A DIRE NEED TO NIP THE EVIL IN THE BUD

Although currently *Zika virus* infection is endemic in Brazil and few other countries but still there is a dire need to cope up with the situation as early as possible in order to prevent the likelihood of epidemic in South Asia. In the presence of Malaria and dengue fever in Pakistan, there is a danger of *Zika virus* disease in future. Therefore necessary actions must be taken by the stake holders and policy makers in order to avoid any undesirable situation in future. There is also a need to focus on discovery of drugs and development of vaccine against *Zika virus* in order to prevent and control the disease.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- Dick GW, Kitchen SF, Haddow AJ. *Zika virus*. Isolations and serological specificity. *Trans R Soc Trop Med Hyg.* 1952;46:509-20.
- Lindenbach BD, Murray CL, Thile HJ, Rice CM. *Flaviviridae: The Viruses and Their Replication*. In: D. M. Knipe, P. M. Howley, editors. *Fields Virology*. volume 1. Lippincott Williams & Wilkins; 2013: 1101-152.
- Aggarwal R, Aggarwal H, Basu M, Chugh P. *Zika virus* disease. *Int J Community Med Public Health.* 2016;3:1352-4.
- Dick GW, Kitchen SF, Haddow AJ. *Zika virus*. I. Isolations and serological specificity. *Trans R Soc Trop Med Hyg.* 1952;46:509–20.
- Cao-Lormeau VM, Roche C, Teissier A, Robin E, Berry AL, Mallet HP, et al. Musso, *Zika virus*, French Polynesia, South Pacific, 2013. *Emerg Infect Dis.* 2014;20:1085–6.
- Duffy MR, Chen TH, Hancock WT, Powers AM, Kool JL, Lanciotti RS, et al. *Zika virus* outbreak on Yap Island, Federated States of Micronesia. *N Engl J Med.* 2009;360:2536-43.
- Hayes EB. *Zika virus* outside Africa. *Emerg Infect Dis.* 2009;15:1347-50.
- Cao-Lormeau VM, Roche C, Teissier A, Robin E, Berry AL, Mallet HP, et al. *Zika virus*, French Polynesia, South Pacific, 2013. *Emerg Infect Dis* 2014;20:1085-6.
- Mlakar J, Korva M, Tul N, Popović M, Poljšak-Prijatelj M, Mraz J, et al. *Zika Virus* Associated with Microcephaly. *N Engl J Med.* 2016;374(10):951-8.
- World Health Organization. *Zika Strategic Response Framework & Joint Operations Plan* (January-June 2016). 2016. Available at <http://apps.who.int/iris/handle/10665/204420>. Accessed on 30 Decemeber 2016.
- Ioos S, Mallet HP, Leparac Goffart I, Gauthier V, Cardoso T, Herida M. Current *Zika virus* epidemiology and recent epidemics. *Med Mal Infect.* 2014;44:302-7.
- Campos GS, Bandeira AC, Sardi SI. *Zika virus* outbreak, Bahia, Brazil. *Emerg Infect Dis.* 2015;21:1885-6.
- Faye O, Faye O, Dupressoir A, Weidmann M, Ndiaye M, Sall AA. One-step RT-PCR for detection of *Zika virus*. *J Clin Virol.* 2008;43:96-101.
- Brasil P, Pereira JP Jr, Moreira ME, Ribeiro Nogueira RM, Damasceno L, Wakimoto M, et al. *Zika Virus* Infection in Pregnant Women in Rio de Janeiro — Preliminary Report. *N Engl J Med.* 2016;375(24):2321-34.
- European centre for disease prevention and control. Rapid risk assessment. *Zika virus* epidemic in the Americas: potential association with microcephaly and Gullian –Barre` syndrome .Stockholm, Sweden: European centre for disease prevention and control; 2015. Available at <http://ecdc.europa.eu/en/publications/zikavirus-America-association-with-microcephalyrapid-risk-assessmeny.pdf>. Accessed on 10 January 2017.
- Calvet G, Aguiar RS, Melo AS, Sampaio SA, de Filippis I, Fabri A, et al. Detection and sequencing of *Zika virus* from amniotic fluid of fetuses with microcephaly in Brazil: a case study. *Lancet Infect Dis.* 2016;16(6):653-60.
- Oliveira Melo AS, Malinger G, Ximenes R, Szejnfeld PO, Alves Sampaio S, Bispo de Filippis AM. *Zika virus* intrauterine infection causes fetal brain abnormality and microcephaly: tip of the iceberg? *Ultrasound Obstet Gynecol.* 2016;47:6 -7.
- Mlakar J, Korva M, Tul N, et al. *Zika virus* associated with microcephaly. *N Engl J Med.* DOI: 10.1056/NEJMoa1600651
- Foy BD, Kobylinski KC, Chilson Foy JL, Blitvich BJ, Travassos da Rosa A, Haddow AD, et al. Probable non-vector-borne transmission of *Zika virus*, Colorado, USA. *Emerg Infect Dis.* 2011;17:880–2.
- Musso D, Roche C, Robin E, Nhan T, Teissier A, Cao-Lormeau VM. Potential sexual transmission of *Zika virus*. *Emerg Infect Dis.* 2015;21:359–61.
- Martines RB, Bhatnagar J, Keating MK, Silva-Flannery L, Muehlenbachs A, Gary J, et al. Zaki, Notes from the field: Evidence of *Zika virus* infection in brain and placental tissues from two congenitally infected newborns and two fetal losses - Brazil, 2015. *MMWR Morb Mortal Wkly Rep.* 2016;65:159–60.
- Brazil Ministry of Health. Microcephly-Ministry of health releases epidemiological bulletin. Available at <http://portalsaude.saude.gov.br/index.php/>

cidadao/principal/agencia-saude/20805-ministerio-da-saude/divulga-boletim-epidemiologico. Accessed on 17 December 2015.

23. WHO. Epidemiological alert: neurological syndrome, congenital malformation and Zika virus infection. Implications for public health in America. Available at <http://www.paho.org/hq/index.php>. Accessed on 05 December 2016.

24. Butler D. Zika virus: Brazil's surge in small-headed babies questioned by report. *Nature*. 2016;530:13-4.

Cite this article as: Qureshi MSH, Qureshi BW, Khan R. Zika virus infection: a public health emergency!. *Int J Sci Rep* 2017;3(3):68-71.