Journal of Diabetic Association Medical College 2019;3(2)9-11

Editorial

Nipah Virus: A Zoonotic Pathogen Endemic to Bangladesh

Khandaker S

Introduction

'Nipah' called upon the name of a Malaysian village,Kampung Sungai Nipah , where the first outbreak was reported in 1999 among the pig farmers. Nipah Virus (NiV) is an emerging and serious zoonotic disease that has a high case fatality rate (approximately 70% or more). It is endemic primarily in the Indo-Bangladesh regions. Since 1997 NiV infection has emerged repeatedly in South East Asia including Bangladesh. From 2001-2018, Bangladesh reported 303 NiV cases, accounting for 211 deaths (approximately a 70 case fatality rate). NiV infection is associated with contact with animals; an environmental exposure, activity, or behavior; or contact with other NiV encephalitis patients. The high mortality rate, broad species tropism, multiple plausible modes of transmission, risk of person-person transmission and documented cases of health care workers being affected during outbreaks has made it a public health issue[1-5].

Bangladesh scenario

The second outbreak of NiV was a geographically upland location, in the Meherpur district of Bangladesh in April-May 2001 with 13 cases and 9 fatalities(69% mortality)[3]. Hereafter nearly annual outbreaks have occurred in Bangladesh and a total of 17 outbreaks have been reported till 2015[3]. All outbreaks were between December to May[4].The endemic districts were Naogaon, Manikganj, Rajbari, Faridpur,Tangail, Thakurgaon and Kustia[6]. In the most recent epidemic at least 15 people died due to NiV infection in Hatibandha, Lalmonirhat district in 2011 adding to the prior death total of 113[6]. Other territories possibly at risk for infection, as evidence of the virus has been found in *Pteropus* and several other bat species.[7]

Viral structure

Nipah virus is an enveloped paramyxovirus with negative-stranded polarity and a non-segmented RNA genome consisting of helical nucleocapsids. Two different strains of NiV- Malaysian and the Bangladeshi have been identified. The two strains are approximately 92% identical on sequencing but significantly different in their pathogenicity and transmissibility[8].

Natural history of disease

Bat urine and saliva are the main source of disease transmission in humans. When they drink raw unpasteurized juice, contaminated unwashed and unpeeled fruits may cause disease transmission. The subsequent outbreaks in Bangladesh and India occur in this way.[6]

Viruse's incubation period varies from 4 hours to 45 days. The estimated fatality rate is 40-75%[5]. Fruit bats of the family Pteropodidae – particularly species belonging to the Pteropus genus– are the natural hosts for NiV. There is no apparent disease in fruit bats due to natural immunity. Recently African fruit bats of same family genus Eidolono was found positive for antibodies against Nipah and Hendra viruses[9].

Human-to-human transmission of NiV has also been reported among family and care givers of infected patients through close contact with patients' secretions and excretions. Nipah outbreaks also reported among pigs and other domestic animals like horses, goats,sheep, cats and dogs and cows. Infection spreads among human by direct unprotected contact with infected animals and their contaminated tisuues[4-6].

After the incubation period, illness range from asymptomatic infection to acute respiratory infection (mild to severe) and fatal encephalitis.Infected people initially develop symptoms including fever, headaches, myalgia, vomiting and sore throat. This can be followed by dizziness, drowsiness, altered consciousness and neurological signs that indicate acute encephalitis[10]. Some people can also experience atypical pneumonia and severe respiratory problems, including acute respiratory distress. Encephalitis and seizures occur in severe cases, progressing to coma within 24 to 48 hours[11].Most people with acute encephalitis make a full recovery, but long term neurologic conditions have been reported in survivors. Approximately 20% of patients are left with residual neurological consequences such as seizure disorder and personality changes. A small number of people who recover subsequently relapse or develop delayed onset encephalitis.The case fatality rate is about 40% to 75%[9-12].

Nipah virus infection can be diagnosed with clinical history during the acute and convalescent phase of the disease. . Diagnosis is usually done by Virus isolation, the detection of antigens or nucleic acids by serology, histopathology from affected organ. The main tests used are real time polymerase chain reaction (RT-PCR) from bodily fluids like blood, throat swab, CSF and urine samples and antibody detection via Enzyme-Linked Immune-Sorbent Assay (ELISA). Viral antigens can be detected in formalin fixed tissues by IHC Antigens found in CNS, Lung and Kidney. Other tests used include PCR assay and virus isolation by cell culture including Vero(African green monkey Kidney), RK-13, BHK or

Correspondence to:
Dr. Shumya Khandaker
Lecturer, Department of Community Medicine
Diabetic Association Medical College, Faridpur.
Email: nila.18fmc@gmail.com

porcine spleen. Virus can also be identified in cultures by immune-staining or virus neutralization. Electron microscopy and immune electron microscopy can aid in identification[1-6].

Prevention

- Immediate quarantine for suspected animals.
- Culling of infected animals by burial or incineration of carcasses to reduce the risk of transmission.
- Routine and thorough cleaning and disinfection of farms with appropriate detergents.
- Gloves and other protective clothing should be worn while handling sick animals or their tissues, and during slaughtering and culling procedures reduce the risk of human-to-human transmission[6].
- The only way to reduce or prevent infection among people by raising awareness on risk factors and by educating them on measures to be taken in reducing exposure to NiV.
- Prevention of transmission by decreasing bat access to date palm sap and other fresh food products.
- Measures to be taken in keeping bats away from sap collection sites with protective coverings.
- Freshly collected date palm juice should be boiled, and fruits should be thoroughly washed and peeled before consumption.
- Fruits with sign of bat bites should be discarded.
- Close unprotected physical contact with NiV-infected people should be avoided.
- Regular hand washing should be carried out after caring or visiting sick people.
- Health-care workers caring for patients with suspected or confirmed infection, or handling specimens from them, should follow standard infection control precautions at all times.
- Samples taken from people and animals with suspected NiV infection should be handled by trained staffs working in well equipped laboratories.
- Standard precautions, hand hygiene and use of personal protective equipment (PPE) should be the pillars of comprehensive infection prevention and control strategy.
- Precautions are to be taken while handling patients, handling the deceased, handling the specimens, cleaning and during waste disposal.
- Washing hands with soap and water or alcohol-based hand rub before and after patient contact.
- The affected person should be immediately transferred to local hospital or medical personal for treatment.
- Patient develops encephalitis symptoms like drowsiness, disorientation, convulsions, coma, respiratory distress like; Acute Respiratory Disease Syndrome (ARDS), should be transferred urgently to available intensive support care facility unit[13].

Treatment

At present no drugs or vaccines specific for NiV infection is available. Intensive supportive care is recommended to treat severe respiratory and neurologic complications[1]which may include mechanical ventilation, treatment of symptoms. Ribavirin is hopeful in some outbreaks but remains to be fully observed. So the most important aspect is isolation of the infected person and to send him to local hospital for diagnosis, treatment and for taking preventive measures[6].

Conclusion

Quarantine measures like closing of schools, avoidance of crowding in home, places should be imposed in the affected area. Most importantly media, local people's representative, health officials, government should take part actively in creating awareness, not to get panic and to explain what preventive measures to take in the affected area.

References

1. Banerjee S, Gupta N, Kodan P, Mittal A, RayY, Nischal N, Soneja M, Biswas A, and Wig V. NiV disease: A rare and intractable disease. Intractable Rare Dis Research.Feb 2019; 8(1): 1-8.doi: 10.5582/irdr. 2018. 01130.
2. Nipah Virus, Regional news room,World Health Organization. 30 May, 2018,Retrived from:https:// www.who.int/news-room/fact-sheets/detail/nipah-virus (accessed: August 10, 2020).
3. Anonymous.NIPAH VIRUS AND OTHER EMERGING INFECTIONS. Retrived From: https:// www.icddrb.org/news-and-events/press-corner/ media-resources/nipah-virus-and-other-emerging-infections (Accessed on:August 10,2020).
4. Chakraborty A, SazzadHMS, HossainMJ , Islam MS, Parveen S, Husain M, Banu SS, Podder G, Afroj S, Rollin PE, Daszak P, Luby SP, Rahman N and Gurley ES. Evolving epidemiology of Nipah virus infection in Bangladesh: evidence from outbreaks during 2010-2011January 2016; 144(2):371-80. doi: 10.1017/ S0950268815001314. Epub 2015 Jun 30.
5. Herriman R. Nipah Virus reported in Thakurgaon, Bangladesh Outbreak News Today. March 4, 2019. Available From:http://outbreaknewstoday.com/ nipah-virus-reported-thakurgaon-bangladesh-85881
6. Rahman MT. Nipa Virus Endemic in Bangladesh. AKMMC J 2011; 2(1): 03-05.
7. Anonymous. Outbreaks in the WHO South-East Asia

Region . Outbreak of Nipah Virus encephalitis in Kerala state of India. Retrived From: https://www.who.int/southeastasia/outbreaks-and-emergencies/health-emergency-information-risk-assessment/surveillance-and-risk-assessment/nipah-virus-outbreak-in-kerala (Accessed on: 20 August, 2020).

8. Wahed F, Kader SA, Nessa A and MahamudMM. Nipah Virus: An Emergent Deadly Paramyxovirus Infection In Bangladesh. Journal of Bangladesh society of physiologist. 2011, 6(2): 134-139.
9. RahmanM andChakraborty A. Nipah Virus outbreaks in Bangladesh: a deadly infectious disease. WHO South East Asia J Public Health. Apr-Jun 2012;1(2): 208-212. doi: 10.4103/2224-3151.206933.PMID: 28612796 DOI: 10.4103/2224-3151.206933.
10. Anonymous.Nipah Virus infection. Wikipedia, the free encyclopedia. Retrived From: https://en.wikipedia.org/wiki/Nipah_virus_infection (Accessed on: 14 August,2020).
11. JM, Hossain MJ, GurleyE, Carroll DS, Croisier A, Bertherat E, Asgari N, Formenty P, Keeler N, ComerJ, Bell MR, Akram R, Molla AR, Zaman R, Islam MR, Wagoner K, Mills JN, Rollin PE, KsiazekTG, and Breiman RF. Risk Factors for Nipah Virus Encephalitis in Bangladesh.2008 Oct; 14(10): 1526-1532. PMCID: PMC2609878PMID: 18826814
12. Davis CP. Nipah Virus Infection transmission. CDC, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of High-Consequence Pathogens and Pathology (DHCPP), Viral Special Pathogens Branch (VSPB).20 March, 2014. Retrived From: https://www.cdc.gov/vhf/nipah/transmission/index.html
13. Donaldson H and Lucey D.Enhancing preparation for large Nipah outbreaks beyond Bangladesh: Preventing a tragedy like Ebola in West Africa. International Journal of Infectious Diseases,July 2018, Pages 69-72.