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Nipah Virus outbreak in the World

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Abstract

A new outbreak of Nipah virus has been reported in Bangladesh in 2013, with 24 cases and 21 deaths till 02 April 2013. Fourteen districts have been affected, namely, Gaibandha, Natore, Rajshahi, Naogaon, Rajbari, Pabna, Jhenaidah, Mymensingh, Nilphamari, Chittagong, Kurigram, Kustia, Magura, and Manikganj. The virus is believed to have been transmitted by the drinking of Nipah-contaminate raw date palm sap in all these cases. Human Nipah virus infection is an emerging zoonotic disease spread from fruit bats. In South-East Asia Region, the disease has been reported in Bangladesh and India.

Keywords:

Introduction

Nipa Virus

Nipah virus (NiV) is a member of the family *Paramyxoviridae*, genus Henipavirus. NiV was initially isolated and identified in 1999 during an outbreak of encephalitis and respiratory illness among pig farmers and people with close contact with pigs in Malaysia and Singapore. Its name originated from Sungai Nipah, a village in the Malaysian Peninsula where pig farmers became ill with encephalitis. Given the relatedness of NiV to Hendra virus, bat species were quickly singled out for investigation and flying foxes of the genus *Pteropus* were subsequently identified as the reservoir for NiV (Distribution Map).

In the 1999 outbreak, Nipah virus caused a relatively mild disease in pigs, but nearly 300 human cases with over 100 deaths were reported. In order to stop the outbreak, more than a million pigs were euthanized, causing tremendous trade loss for Malaysia. Since this outbreak, no subsequent cases (in neither swine nor human) have been reported in either Malaysia or Singapore.

In 2001, NiV was again identified as the causative agent in an outbreak of human disease occurring in Bangladesh. Genetic sequencing confirmed this virus as Nipah virus, but a strain different from the one identified in 1999. In the same year, another outbreak was identified retrospectively in Siliguri, India with reports of person-to-person transmission in hospital settings (nosocomial transmission). Unlike the Malaysian NiV outbreak, outbreaks occur almost annually in Bangladesh and have been reported several times in India. ransmission of Nipah virus to humans may occur after direct contact with infected bats, infected pigs, or from other NiV infected people.

In Malaysia and Singapore, humans were apparently infected with Nipah virus only through close contact with infected pigs. The NiV strain identified in this outbreak appeared to have been transmitted initially from bats to pigs, with subsequent spread within pig populations. Incidental human infections resulted after exposure to infected pigs. No occurrence of person-to-person transmission was reported in this outbreak.

Conversely, person-to-person transmission of Nipah virus in Bangladesh and India is regularly reported. This is most commonly seen in the family and caregivers of Nipah virus-infected patients. Transmission also occurs from direct exposure to infected bats. A common example is consumption of raw date palm sap contaminated with infectious bat excretions.

Signs and Symptoms: **I**nfection with Nipah virus is associated with encephalitis (inflammation of the brain). After exposure and an incubation period of 5 to 14 days,illness presents with 3-14 days of fever and headache, followed by drowsiness, disorientation and mental confusion. These signs and symptoms can progress to coma within 24-48 hours. Some patients have a respiratory illness during the early part of their infections, and half of the patients showing severe neurological signs showed also pulmonary signs.

During the Nipah virus disease outbreak in 1998-99, 265 patients were infected with the virus. About 40% of those patients who entered hospitals with serious nervous disease died from the illness.

Long-term sequelae following Nipah virus infection have been noted, including persistent convulsions and personality changes.

Latent infections with subsequent reactivation of Nipah virus and death have also been reported months and even years after exposure.

Risk of Exposure: In the Malaysia and Singapore outbreak, Nipah virus infection was associated with close contact with Nipah virus-infected pigs.

In Bangladesh and India, where Nipah virus infection is more frequent, exposure has been linked to consumption of raw date palm sap and contact with bats. Importantly, human-to-human transmission has been documented and exposure to other Nipah virus infected individuals is also a risk factor.

Diagnosis: Laboratory diagnosis of a patient with a clinical history of NiV can be made during the acute and convalescent phases of the disease by using a combination of tests. Virus isolation attempts and real time polymerase chain reaction (RT-PCR) from throat and nasal swabs, cerebrospinal fluid, urine, and blood should be performed in the early stages of disease. Antibody detection by ELISA (IgG and IgM) can be used later on. In fatal cases, immunohistochemistry on tissues collected during autopsy may be the only way to confirm a diagnosis.

Treatment: Treatment is limited to supportive care. Because Nipah virus encephalitis can be transmitted person-to-person, standard infection control practices and proper barrier nursing techniques are important in preventing hospital-acquired infections (nosocomial transmission).

The drug ribavirin has been shown to be effective against the viruses in vitro, but human investigations to date have been inconclusive and the clinical usefulness of ribavirin remains uncertain.

Passive immunization using a human monoclonal antibody targeting the Nipah G glycoprotein has been evaluated in the post-exposure therapy in the ferret model and found to be of benefit.

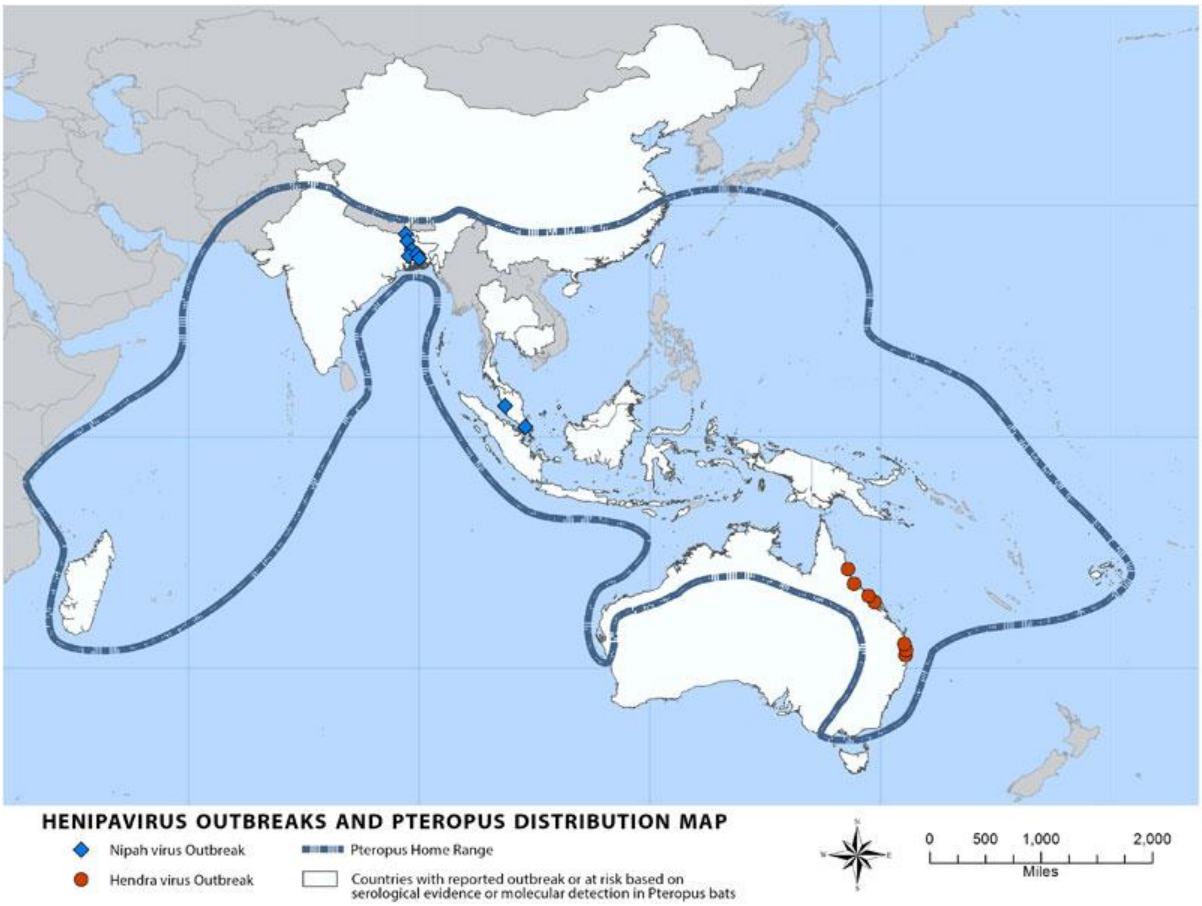
Prevention

Nipah virus infection can be prevented by avoiding exposure to sick pigs and bats in endemic areas and not drinking raw date palm sap.

Additional efforts focused on surveillance and awareness will help prevent future outbreaks. Research is needed to better understand the ecology of bats and Nipah virus, investigating questions such as the seasonality of disease within reproductive cycles of bats. Surveillance tools should include reliable laboratory assays for early detection of disease in communities and livestock, and raising awareness of transmission and symptoms is important in reinforcing standard infection control practices to avoid human-to-human infections in hospital settings (nosocomial infection).

A subunit vaccine, using the Hendra G protein, produces cross-protective antibodies against HENV and NIPV has been recently used in Australia to protect horses against Hendra virus. This vaccine offers great potential for henipavirus protection in humans as well.

Nipah Virus Distribution Map:-



Frequently Asked Questions: Nipah Virus:- What is Nipah virus?

Nipah virus is a type of virus that can infect people and cause severe illness.

Where is Nipah virus found?

Nipah virus was first discovered in 1999 following a large outbreak in Malaysia and Singapore. Sizeable outbreaks also occurred in West Bengal, India in 2001, and in Bangladesh in 2004. In 2018, an outbreak was reported in the Kerala state of India, which is currently ongoing. Other countries thought to be at risk for Nipah virus include Australia, Cambodia, China, Indonesia, Madagascar, Taiwan, Thailand, Bhutan, Brunei, Laos, Madagascar, Myanmar, Nepal, Philippines, Papua New Guinea, and Vietnam.

How do people get Nipah virus?

People can get Nipah virus from contact with the excrement or droppings of infected fruit bats, pigs, or from other people infected with Nipah virus. People can also get infected with Nipah virus when they consume raw date palm sap (a drink found in parts of Asia) that is contaminated with bat droppings.

Do animals get sick from Nipah virus?

The main reservoir, or carrier, animal of Nipah virus is a species of fruit bat found in Southeast Asia. Fruit bats do not get sick from Nipah virus. However, they can pass the virus to other animals such as pigs, which can get sick. These animals can then pass the virus along to people.

How can people spread Nipah virus to each other?

Nipah virus is spread from person to person through contact with infectious body fluids from another person such as nasal or respiratory droplets, urine, or blood.

How can people protect themselves from getting Nipah virus?

People can protect themselves from getting Nipah virus by limiting their contact with fruit bats and sick pigs in affected areas of Southeast Asia, and by not drinking raw date palm sap. People should also avoid direct contact with body fluids from infected patients by wearing appropriate personal protective equipment such as gloves, gown, and facemask, and practicing good hand hygiene.

What are the symptoms of Nipah virus?

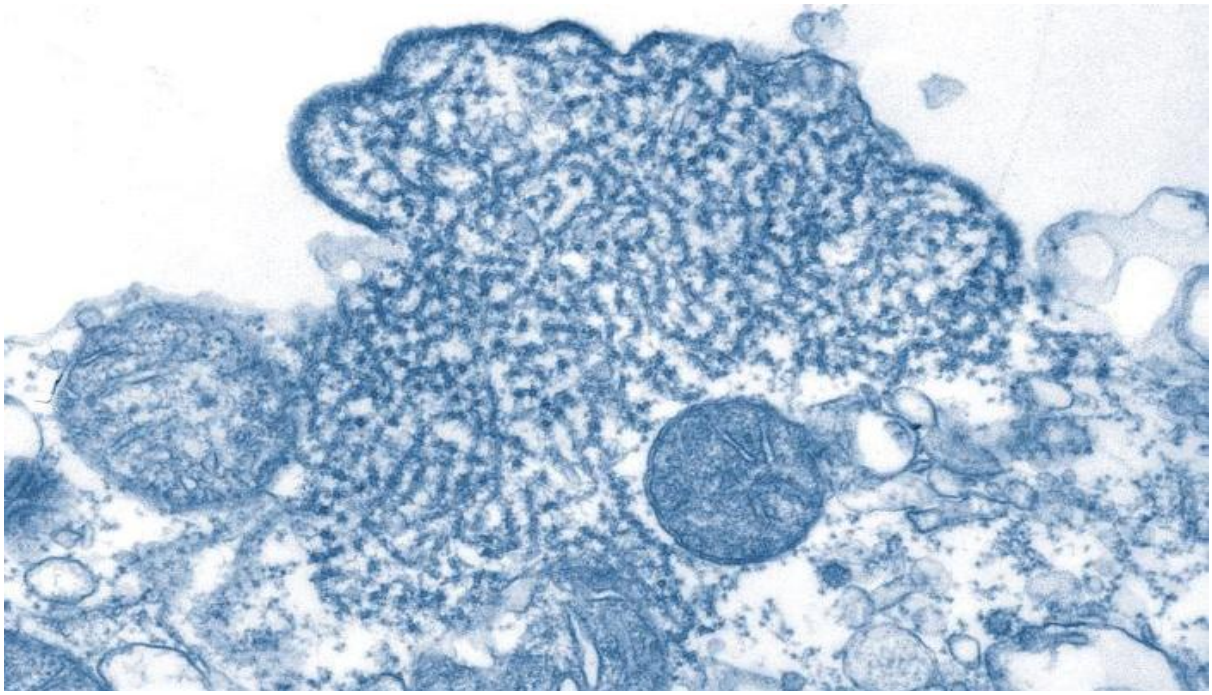
Typically, people become ill between 5 to 14 days after they are infected. Initial symptoms can include fever, headache, nausea and vomiting, shortness of breath, and may worsen to include drowsiness, confusion, and coma. Death can occur in as many as 80% of cases.

What is the treatment for Nipah virus?

At this time, the only treatment for Nipah virus is supportive care. There are no antivirals or other medicines that have been found to conclusively treat Nipah virus infection in people.

Is there a vaccine for Nipah virus?

There is currently no vaccine available for Nipah virus.



By Flickr: Microbe World. According to the Bangladesh Institute of Epidemiology, Disease Control and Research (IEDCR), as of February 2015, nine cases of Nipah virus have been recorded across the country . The reported cases stem from six districts – Nilphamari, Faridpur, Magura, Ponchoghor, Naugaon, and Rajbari . Case analysis reveals that 56% of recent cases have been male, with the median age across those infected, as 15 years of age.

A History of Nipah Virus: Nipah virus (NiV) was isolated and identified for the first time in 1998, when pig farmers and individuals who had close contact with pigs, became ill with encephalitis and respiratory illness in Malaysia and Singapore. The first outbreak took place in Kampung Sungai Nipah, Malaysia – a location for which the virus would be named after . The first outbreak produced only mild disease in pigs, but resulted in approximately 300 human cases, with 100 fatalities . Case fatality for Nipah in general is estimated to be between 40% to 75%. However, the World Health Organization (WHO) highlights that this rate may vary depending on surveillance capacities involved in the outbreaks . Since the first outbreak, there have been no intermediate hosts associated with subsequent outbreaks – that is, no pigs were linked to human infections. A CDC study discovered that human infections have been due to the consumption of virus-contaminated date palm sap. NiV is part of the family *Paramyxoviridae*, within the genus Henipavirus. Scientists have since traced NiV back to Indian flying foxes, a type of fruit bat found across southern Asia. Date palm sap happens to be a delicacy sought after by both bats and humans. The sap is collected from date palm tree trunks. The trees are tapped using machetes and the flowing sap collected into clay pots overnight. At night, when the bats forage for food, they sometimes drink the sweet sap collected in the pots, and subsequently contaminate the sap with NiV through their bodily fluids, such as saliva, feces, or urine]. The unknowingly-contaminated sap is then sold at markets, where direct consumption of NiV results in the spread of the virus through local populations.

Preventive Measures: There is no treatment or vaccine for NiV, so preventive measures are of critical importance for protection against infection . Cooking or fermenting palm sap can destroy the virus, but most sap sold at markets is often sold and consumed raw. Therefore, avoiding palm sap completely can prevent NiV infection. Additionally, people can avoid exposure with ill pigs and bats in areas considered to be endemic with NiV. . Efforts that include enhanced surveillance systems, increased public awareness, and interventions including the use of bamboo screens on top of the palm sap pots, can also prevent future outbreaks.

Infectious Disease Update: Nipah Outbreak in Kerala, India. India's southern state of Kerala was put under a lot of stress this past May with the most recent Nipah virus outbreak. The Nipah virus, which is carried by *Pteropus* fruit bats, is a newly emerging zoonotic disease that affects both animals and humans. This is the first ever outbreak of Nipah in the state of Kerala . Earlier cases of the virus were reported in West Bengal's districts of Siliguri in 2001 and Nadia in 2007, with around 47 deaths reported. The first victims of the current outbreak are said to be siblings Mohammad Sadik (26 years old) and Mohammad Salih (28 years old) who died on May 5th and 18th respectively, in Perambra village in the district of Kozhikode. Their aunt and father died a few days after them, along with a nurse that was treating Salih in Taluk Hospital. In late May, Kerala's state government issued a warning for travelers to avoid the districts of Kozhikode, Malappuram, Waynad and Kannur, as the death count rose to ten. here have been 17 total cases of death from Nipah with one confirmed case recovered , but no new cases have been reported since the end of May . Unfortunately, the fatality rate of this outbreak was 70%. Thankfully, the outbreak has been contained, with cases reported now only in the districts of Kozhikode and Malappuram. Not all infected patients seemed to transmit the disease, only those in the acute stages [6], which has helped to avoid a second wave of the outbreak. All known cases thus far were people in contact with the infected brother Salih or who shared a hospital ward with him or with those who became infected. Furthermore, health authorities have drawn up a list of 1,949 people who have been in contact with Nipah-affected people to monitor their health conditions After the first two victims' deaths, authorities discovered insectivorous bats living in the well of the infected family, which was their main source of water, but the bats along with local cattle and pigs tested negative for Nipah in Kozhikode. However, authorities tested the wrong kind of bat; fruit bats of the Pteropodidae family, and Pteropus genus are known as the reservoir species for Nipah, acting as the primary host for the virus and carry and transmit it without showing symptoms. This led to confusion and misleading news reports claiming that bats have been proven not to be the source of infection. The government then announced that a multi-disciplinary team was investigating the situation and advised the public not to spread fear and rumors through social media. Even after 21 fruit bat samples tested negative for Nipah, authorities concluded this did not eliminate fruit bats as the source of infection. Nipah outbreaks are very rare because, although fruit bats are common in India, only a few of them are infected with the virus at any one point in time, and they only have a very short window of opportunity to infect others or transmit the virus to humans . Therefore, if a large number of fruit bats is sampled and all of them test negative for Nipah, it does not rule out the bats as the source of infection. Bats may only be infectious for a couple of weeks and then no longer carry the virus. For example, a 2012 study found Nipah in only one of 140 bats tested in Maharshtra and West Bengal and the other bats did not even show evidence of an antibody against the virus. In response to the Nipah outbreak and fruit bat testing, the United Arab Emirates banned imports from Kerala due to fear of spreading the virus through contaminated fruits and vegetables . Fruits and vegetables can become contaminated with Nipah if an infected bat tries to consume fruit or leaves saliva or excretions on it. The virus can then be transmitted to humans or animals who eat any part of the fruit or its juice; furthermore, if an intermediate animal eats contaminated fruit it can also transmit the virus to humans through its saliva and feces. As a precaution, the Kerala state government advised people against eating marked and bruised fruit or fruit found on the ground, to stay clear of areas with bats, and to boil drinking water. Although the source of the outbreak in Kerala suggests fruit bats, specifically *Pteropus medius* , the ecological driver and mechanism for the transmission of the Nipah virus is humans. As fruit bats' habitat is destroyed by humans, they become stressed and hungry, which weakens their immune system, making them more susceptible to the Nipah virus and causing them to excrete the virus through their urine and saliva . For example, the El Nino event in 1997 led to fires in Kalimanatan and Sumatra in Malaysia, destroying approximately five million hectares of forest. The haze from the fires badly affected flowering and fruiting trees in southern Malaysia, forcing fruit bats to migrate to orchard farms surrounded by pig farms, leading to transmission of the virus from bats to pigs to humans. It is important to bring awareness of the impact humans have on bat species and to prevent disproportionate fear and negative sentiment that may lead to animal culling. Fruit bats are an important ecological species for pollination and seed dispersal, preventing deforestation. The Nipah virus was first detected as the source of an outbreak in Malaysia in 1998-1999 and was named after the Sungai Nipah village on the banks of the Nipah River [5]. The virus belongs to a genus of paramyxoviruses (Heniparivurs), which includes the Hendra virus found in Australia that causes acute respiratory distress and encephalitis.

Previous studies on outbreaks show that Nipah virus can be transmitted to humans in three different ways. The first is from infected bats to humans who come in contact with material contaminated by bats; between 2001 and 2007 in Bangladesh, there were more than 20 incidences of bat to human transmission reported through the consumption of date palm sap contaminated by bat urine or saliva [6]. This is the most likely route of transmission in the current outbreak as the palm sap is commonly used in Indian drinks [4]. A second way is from intermediate hosts such as pigs, horses and other domesticated animals; the outbreak in Malaysia in 1998 was traced from pigs who ate fruits infected by bats and then passed it to humans [6]. The last route of transmission is from infected humans. Risk of transmission between humans is relatively low because it requires close contact with bodily secretions such as urine and saliva. Ways of preventing transmission include: actively monitoring and quarantining suspected cases; using gloves, masks and face shields to limit spread; funeral practices that avoid bodily fluids; and reduction of fomite transmission by cleaning surfaces in contact with infected people [5]. The incubation period ranges from four to 14 days, leading to clinical symptoms that include fever and headaches, which can progress to drowsiness, disorientation, mental confusion, and encephalitis in less than a week. There are no drugs or vaccines to treat Nipah, intensive supportive care is the only recommended treatment. However, the Indian Council for Medical Research (ICMR) reached out to the University of Queensland, Australia in May to develop an antibody, which it arrived in Kozhikode on Saturday June 2nd and was administered to cases who tested positive that following week. The antibody does not act as a vaccine, but acts to neutralize the effects of the virus. In terms of detecting Nipah infection, molecular tests such as polymerase chain reaction (RT-PCR) and next generation sequencing are the most rapid and accurate tools available, using body fluids such as blood and saliva. Additionally, an enzyme-linked immunosorbent assay (ELISA) test can detect the entire viral antigen.

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