

NIPAH Virus

* Dr.Prajakta Ghatage, ** Dr.Ramesh Kothari, *** Dr. Sunil Mhakse

* Resident, ** Professor and Head, Department of Paediatrics, *** Dean, Dr. Vithalrao Vikhe Patil Foundation's Medical College Ahmednagar

Corresponding Author: Dr. Prajakta Ghatage

Mail id: prajaktaghatage38@gmail.com

Mobile No.: 7276613919.

Address : Department of Paediatrics,
Dr. Vithalrao Vikhe Patil Foundation's Medical college Ahmednagar

Abstract :

Nipah virus (NiV) infection is a newly emerging zoonosis that causes severe disease in both animals and humans. The natural host of the virus are fruit bats of the Pteropodidae Family, Pteropus genus. NiV was first identified during an outbreak of disease that took place in Kampung Sungai Nipah, Malaysia in 1998. On this occasion, pigs were the intermediate hosts. In Bangladesh in 2004, humans became infected with NiV as a result of consuming date palm sap that had been contaminated by infected fruit bats. Human-to-human transmission has also been documented, including in a hospital setting in India.

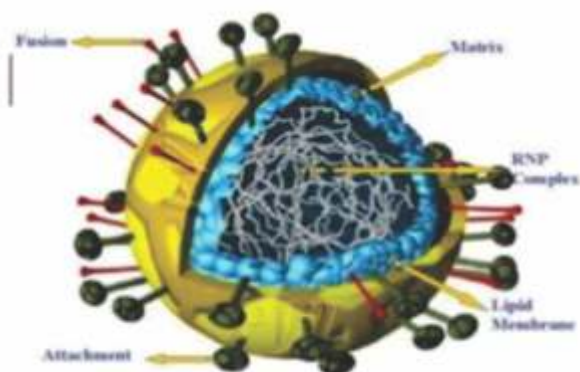
NiV infection in humans has a range of clinical presentations, from asymptomatic infection to acute respiratory syndrome and fatal encephalitis. NiV is also capable of causing disease in pigs and other domestic animals. There is no vaccine for either humans or animals. The primary treatment for human cases is intensive supportive care.

Introduction : The organism which causes Nipah Virus encephalitis is an RNA virus of the family Paramyxoviridae, genus Henipavirus, and is closely related to Hendra virus. Nipah virus (NiV) is a zoonotic virus (it is transmitted from animals to humans) and can also be transmitted through contaminated food or directly between people. There is evidence of Nipah infection among several species of domestic animals including dogs, cats, goats,

and horses. Sheep may also be affected. However, since the initial outbreak it has primarily affected humans in different parts of the world. Nipah Virus infection, also known as Nipah Virus encephalitis, was first isolated and

described in 1999. The name, Nipah, is derived from the village in Malaysia where the person from whom the virus was first isolated succumbed to the disease. In infected people, it causes a range of illnesses from asymptomatic (subclinical) infection to acute respiratory illness and fatal encephalitis. The virus can also cause severe disease in animals such as pigs, resulting in significant economic losses for farmers.⁽¹⁾

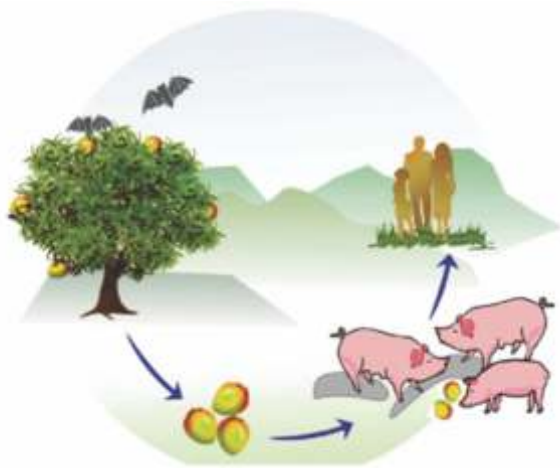
Although Nipah virus has caused only a few known outbreaks in Asia, it infects a wide range of animals and causes severe disease and death in people, making it a public health concern. The case fatality rate is estimated at 40% to 75%. This rate can vary by outbreak depending on local capabilities for epidemiological surveillance and clinical management.



Fig(1) Structure of Nipah virus

Transmission : During the first recognized outbreak in Malaysia, which also affected Singapore, most human infections resulted from direct contact with sick pigs or their contaminated tissues. Transmission is thought to have occurred via unprotected exposure to secretions from the pigs, or unprotected contact with the tissue of a sick animal. In subsequent outbreaks in Bangladesh and India, consumption of fruits or fruit products (such as raw date palm juice) contaminated with urine or saliva from infected fruit bats was the most likely source of infection. Human-to-human transmission of Nipah virus has also been reported among family and care givers of

infected patients. During the later outbreaks in Bangladesh and India, Nipah virus spread directly from human-to-human through close contact with people's secretions and excretions. In Siliguri, India in 2001, transmission of the virus was also reported within a health-care setting, where 75% of cases occurred among hospital staff or visitors. From 2001 to 2008, around half of reported cases in Bangladesh were due to human-to-human transmission through providing care to infected patients. Till May 2018 in Kerala, India total cases reported are 14 out of which case fatality was 12.⁽²⁾



Fig(2) Transmission of Nipah Virus

Clinical features : Human infections range from asymptomatic infection to acute respiratory infection (mild, severe), and fatal encephalitis. Infected people initially develop influenza-like symptoms of fever, headaches, myalgia (muscle pain), vomiting and sore throat. This can be followed by dizziness, drowsiness, altered consciousness, and neurological signs that indicate acute encephalitis. 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. The incubation period (interval from infection to the onset of symptoms) is believed to range from 4 to 14 days. However, an incubation period as long as 45 days has been reported.

Most people who survive 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 estimated at 40% to 75%.⁽³⁾ This rate can vary by outbreak depending on local capabilities for epidemiological surveillance and clinical management.

Diagnosis : Initial signs and symptoms of Nipah virus infection are nonspecific, and the diagnosis is often not suspected at the time of presentation. This can hinder accurate diagnosis and creates challenges in outbreak detection, effective and timely infection control measures, and outbreak response activities. In addition, the quality, quantity, type, timing of clinical sample collection and the time needed to transfer samples to the laboratory can affect the accuracy of laboratory results.

Nipah virus infection can be diagnosed with clinical history during the acute and convalescent phase of the disease. The main tests used are real time polymerase chain reaction (RT-PCR) from bodily fluids and antibody detection via enzyme-linked immunosorbent assay (ELISA). Other tests used include polymerase chain reaction (PCR) assay, and virus isolation by cell culture.⁽⁴⁾

Nipah virus infect in animals : Nipah Virus in pigs affects the respiratory and nervous systems. It is known as porcine respiratory and neurologic syndrome, porcine respiratory and encephalitic syndrome (PRES), and barking pig syndrome (BPS). It is a highly contagious disease in pigs; however the clinical signs vary depending on the age and the individual animal's response to the virus. In general, mortality (death due to the disease) is low except in piglets. However, morbidity (illness from the disease) is high in all age groups.

Most pigs develop a febrile respiratory disease with a severe cough and difficulty breathing. While the respiratory signs predominate, encephalitis has been described, particularly in sows and boars, with nervous signs including twitching, trembling, muscle fasciculation, spasms, muscle weakness, convulsions, and death. Some animals, however, remain asymptomatic.⁽⁵⁾

Treatment : There is no definitive treatment for the infection. Symptomatic management is the only treatment available. There are currently no drugs or vaccines specific for Nipah virus infection although WHO has identified Nipah as a priority disease for the WHO Research and Development Blueprint. Intensive supportive care is recommended to treat severe respiratory and neurologic complications.⁽⁶⁾

Prevention : Prevention and control measures focus on immediate eradication by mass culling of infected and in-contact pigs and on antibody surveillance of high risk farms to prevent future outbreaks. After culling, the burial sites are disinfected with chlorinated lime. It is also recommended to use sodium hypochlorite (bleach) to disinfect the contaminated areas and equipment. Other important control measures have been a ban on transporting pigs within the countries affected, a temporary ban on pig production in the regions affected, as well as improvement of biosecurity practices. Education and use of personal protective equipment (PPE) by persons exposed to potentially infected pigs is highly recommended. Also, improved hygiene at pig operations is suggested. One of the most important biosecurity measures for affected areas is to decrease the likelihood of the bat reservoir coming into contact with pig production facilities.

Research into development of vaccines has been ongoing in Australia and France.⁽⁷⁾

1. Controlling Nipah virus in pigs : Currently, there are no vaccines available against Nipah virus. Based on the experience gained during the outbreak of Nipah involving pig farms in 1999, routine and thorough cleaning and disinfection of pig farms with appropriate detergents may be effective in preventing infection. If an outbreak is suspected, the animal premises should be quarantined immediately. Culling of infected animals – with close supervision of burial or incineration of carcasses – may be necessary to reduce the risk of transmission to people. Restricting or banning the movement of animals from infected farms to other areas can reduce the spread of the disease. As Nipah virus outbreaks have involved pigs and/or fruit bats, establishing an animal health/wildlife surveillance system, using a One Health approach, to

detect Nipah cases is essential in providing early warning for veterinary and human public health authorities.

2.Reducing the risk of infection in people : In the absence of a vaccine, the only way to reduce or prevent infection in people is by raising awareness of the risk factors and educating people about the measures they can take to reduce exposure to the Nipah virus.

Public health educational messages should focus on :

- Reducing the risk of bat-to-human transmission. Efforts to prevent transmission should first focus on decreasing bat access to date palm sap and other fresh food products. Keeping bats away from sap collection sites with protective coverings (such as bamboo sap skirts) may be helpful. 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.
- Reducing the risk of animal-to-human transmission. Gloves and other protective clothing should be worn while handling sick animals or their tissues, and during slaughtering and culling procedures. As much as possible, people should avoid being in contact with infected pigs. In endemic areas, when establishing new pig farms, considerations should be given to presence of fruit bats in the area and in general, pig feed and pig shed should be protected against bats when feasible.
- Reducing the risk of human-to-human transmission. Close unprotected physical contact with Nipah virus-infected people should be avoided. Regular hand washing should be carried out after caring for or visiting sick people.

3. Controlling infection in health-care settings :

Health-care workers caring for patients with suspected or confirmed infection, or handling specimens from them, should implement standard infection control precautions at all times. As human-to-human transmission has been reported, in particular in health-care settings, contact and droplet precautions should be used in addition to standard precautions. Samples taken from people and animals with

suspected Nipah virus infection should be handled by trained staff working in suitably equipped laboratories.^(8,9)

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