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Review Article

A REVIEW ARTICLE ON NIPAH VIRUS

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ABSTRACT

Nipah virus is a zoonotic virus (it is transmitted from animals to humans), is a member of the family Paramyxoviridae, genus Henipavirus. It is Intially isolated and identified in 1999 at Malaysia and Singapore in Pig Farmers with symptoms of Respiratory illness. In Present Review work Research is conducting on Latest case study on Nipah virus outbreak in villeage Changaroth of District Kozhikode and Malappuram in North Kerala in May 2018.

KEYWORDS: *NiV, NCDC, WHO, Ribavirin and Nyctanthes arbor-tristis.*

INTRODUCTION

Nipah virus (NiV) is a member of the family *Paramyxoviridae* [1], genus Henipavirus. NiV was initially isolated [2] 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 outbreat, 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.

The Nipah virus infection has become endemic in Bangladesh, causing regularly outbreaks, in particular in districts where date palms (Table No. 1).

Symptoms:

The incubation period generally varies from four days to 2 weeks [5], but may be extended up to 45 - 60 days [5, 6]. The clinical course is characterized by high fever followed by seizure and death due to encephalitis or respiratory disease. Human infections range from asymptomatic infection to fatal encephalitis. Infected people initially develop influenza-like symptoms of high fever, headache, myalgia, sore throat and weakness. This can be followed by impairment in spatial perception and stability, feeling abnormally sleepy, altered consciousness, and neurological signs, sometimes accompanied by nausea and vomiting that indicate acute encephalitis [6]. Some patients infected with NiV Bangladesh strain can also experience atypical pneumonia and severe respiratory problems, including acute respiratory distress [7]. Seriously affected patients can develop septicaemia, gastrointestinal bleeding, and renal impairment [8]. Encephalitis and seizures occur in severe cases, progressing to coma within 24 to 48 hours [6]. The case fatality rate estimates remain ~40- 100% during sporadic outbreaks (Table 1). Most people who survive acute encephalitis make a full recovery, but around 20% are left with residual neurological consequences such as persistent convulsions and personality changes [9]. A limited number of recovered patients may experience encephalitic relapse up to

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years later and subclinically infected individuals may show central nervous signs up to 4 years later [10].

LATEST CASE STUDY

Kerala's Kozhikode is on high alert as a deadly virus called 'Nipah' (NiV) claimed 15 lives in the state. The fast-spreading virus Nipah reported has a mortality rate of 70 per cent. The central government on Monday28th, May, 2018 sent a multi-disciplinary Central team from the National Centre for Disease Control (NCDC) to the district in the wake of deaths due to Nipah virus outbreak. Kerala Government has assured that all arrangements are on place and there is no need to panic. It also sanctioned an emergency fund of Rs 2 million (Rs 20 lakh) to the Kozhikode Medical College to tackle the fever outbreak.

The Kerala health ministry on Tuesday said the Nipah virus has so far claimed 10 lives in Kozhikode and Malappuram districts in north Kerala while the condition of two persons undergoing treatment for the viral disease is said to be critical.

Valachekutti Moosa, 62, has lost three members of his family while he and his son's fiancée are battling for life after getting infected in Kozhikode district's Changaroth village between May 5 and 19 from what was then termed as a 'mystery disease'.

Table No. 1: Chronology of outbreaks due to Nipah virus [3, 4]

Year	Country	State or District	Cases	Deaths	Case fatality
1998 - 1999	Malaysia	Perak, Selangor, Negeri Sembilan states	265	105	40%
1999	Singapore	Singapore	11	1	9%
2001	India	Siliguri district, West Bengal	66	49	74%
2001	Bangladesh	Meherpur district	13	9	69%
2003	Bangladesh	Naogaon district	12	8	67%
2004	Bangladesh	Faridpur and Rajbari districts	67	50	75%
2005	Bangladesh	Tangail dstrict	12	11	92%
2007	Bangladesh	Thakurgaon, Naoga and Kushtia districts	18	9	50%
2007	India	Nadia district, West Bengal	5	5	100%
2008	Bangladesh	Manikgonj, Rajbari and Faridpur district	11	9	82%
2009	Bangladesh	Rajbari, Gaibandha, Rangpur and Nilphamari districts	4	1	25%
2010	Bangladesh	Faridpur, Rajbari, Gopalganj and Madaripur districts	16	14	88%
2011	Bangladesh	Lalmonirhat, Dinajpur, Comilla, Nilphamari and Rangpur districts	44	40	91%
2012	Bangladesh	Joypurhat Rajshahi, Natore, Rajbari and Gopalganj districts	12	10	83%
2013	Bangladesh	Gaibandha, Jhinaidaha, Kurigram, Kushtia, Magura, Manikgonj, Mymenshingh, Naogaon, Natore, Nilphamari, Pabna, Rajbari and Rajshahi districts	24	21	87%

Fig. 1: Animal Husbandry department and forest officials inspect a well to catch bats at Changaroth in Kozhikode in Kerala on May 21, 2018.(AFP Photo)

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The Mode of Transmission:

Infected bats shed virus in their excretion and secretion such as saliva, urine, semen and excreta but they are symptomless carriers. The NiV is highly contagious among pigs, spread by coughing. Direct contact with infected pigs was identified as the predominant mode of transmission in humans when it was first recognized in a large outbreak in Malaysia in 1999 [11]. Ninety percent of the infected people in the 1998-1999 outbreaks were pig farmers or had contact with pigs.

There is strong evidence that emergence of bat-related viral infection communicable to humans and animals have been attributed to the loss of natural habitats of bats. As the flying fox habitat is destroyed by human activity the bats get stressed and hungry, their immune system gets weaker, their virus load goes up and a lot of virus spills out in their urine and saliva [12]. Similar fluctuation of virus shedding may be associated with the stressful physiological conditions or seasons. Evidence of seasonal preference of transmission in P. lylei was recently demonstrated in a study in Thailand. The period of following months April-June was the time (highest in May) when viral RNA could be mainly detected in urine which was associated with a fluctuation of population numbers that was observed only in May and correlated with young bats leaving to fly. There were focal outbreaks of NiV in Bangladesh and India in 2001 during winter.

Drinking of fresh date palm sap, possibly contaminated by fruit bats (P. giganteus) during the winter season, may have been responsible for indirect transmission of Nipah virus to humans [13]. There is circumstantial evidence of human-to-human transmission in India in 2001. During the outbreak in Siliguri, 33 health workers and hospital visitors became ill after exposure to patients hospitalized with Nipah virus illness, suggesting nosocomial infection [14]. During the Bangladesh outbreak the virus is suggested to have been transmitted either directly or indirectly from infected bats to humans. Strong evidence indicative of human- to-human transmission of NiV was found in Bangladesh in 2004 [15].

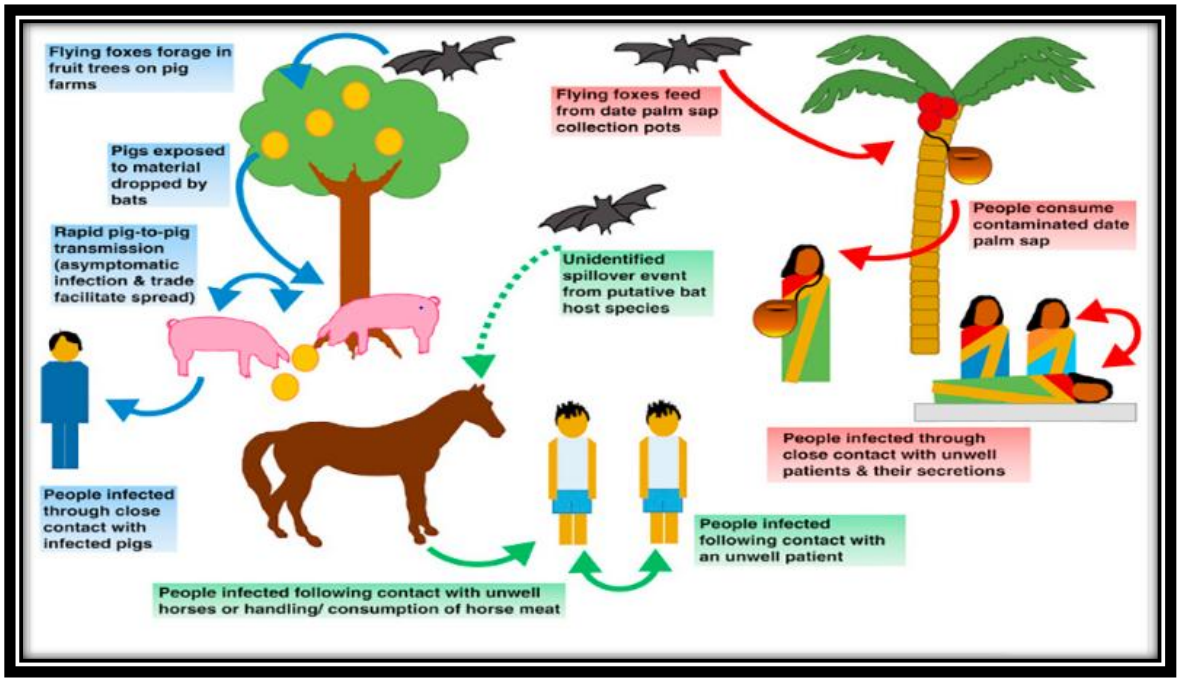

Fig. 2: Mode of Transmission

Laboratory Diagnosis:

Samples:

Oro-pharyngeal/nasal swabs, urine, and serum can be used for isolation from live animals, while brain, lung, kidney, and spleen samples can be used post mortem [16]. If possible, urine should also be collected for analysis [16]. Strict biosecurity protocols, including stringent use of personal protective equipment, should be followed when sampling pigs with suspected NiV infection.

Procedures for the laboratory diagnosis of NiV include serology, histopathology, PCR and virus isolation. Serum Neutralization Test, ELISA, RT-PCR are used for laboratory confirmation

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.

Most countries in the South-East Asia Region do not have adequate facilities for diagnosing the virus or on ways of controlling it. Bangladesh, India and Thailand have developed laboratory capacity for diagnostic and research purposes.

Nipah virus is classified internationally as a biosecurity level (BSL) 4 agent. BSL 2 facilities are sufficient if the virus can be first inactivated during specimen collection [17]. There are a few laboratories in which the virus can be studied safely without a risk of it "escaping" and infecting more people

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Prevention and Control:

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).

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.

There is no effective treatment for Nipah virus disease, but ribavarin may alleviate the symptoms of nausea, vomiting, and convulsions [18]. Treatment is mostly focused on managing fever and the neurological symptoms. Severely ill individuals need to be hospitalized and may require the use of a ventilator.

Human-to-human transmission of NiV has been reported in recent outbreaks demonstrating a risk of transmission of the virus from infected patients to healthcare workers through contact with infected secretions, excretions, blood or tissues. Healthcare workers caring for patients with suspected or confirmed NiV should implement Standard Precautions when caring for patients and handling specimens from them. A WHO Aide–memoire on Standard Precautions in health care is available at: http://www.who.int/csr/resources/publications/standardprecautions/en/index.html

A vaccine is being developed. A recombinant sub-unit vaccine formulation protects against lethal Nipah virus challenge in cats [19]. ALVAC Canarypox vectored Nipah F and G vaccine appears to be a promising vaccine for swine and has potential as a vaccine for humans [20]. The main strategy is to prevent NiV in humans. Establishing appropriate surveillance systems will be necessary so that NiV outbreaks can be detected quickly and appropriate control measures initiated.

TREATMENT

Treatment is supportive, with some patients requiring measures such as mechanical ventilation. Ribavirin appeared to be promising in some outbreaks, but had little or no effect on the outcome in animal models, and its efficacy is currently considered to be uncertain. Other potential treatments, such as the administration of antibodies to Nipah virus, are being investigated in preclinical studies. Medicine is Nyctanthes arbor-tristis leaves.

CONCLUSION

Nipah virus infection is Emerging infectious disease spread by secreation of infected bats. It can spread to humans through contaminated Fruit, infected animals or through close contact with infected humans.

NiV disease outbreak was reported from Kozhikode District of Kerala, India. This is first NiV outbreak in South India. There have been 17 deaths and 18 confirmed cases as of 1st June 2018. The two effeted districts are Kozhikode and Malappuram A muliti-disciplinary team led by the Govt of India. National Center for Disease Control (NCDC) is in kerala in response to the outbreak. WHO Providing technical support to the Govt of India as needed.

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