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CURRENT SCENARIO OF NIPAH VIRUS: A REVIEW

SWATHI. S[1], NAVEEN KUMAR. C[2*], SRIKUMAR. R[3], VIJAYAKUMAR. R[4], THIRUSELVAKUMAR. D[5] AND PRABHAKAR REDDY. E[6]

1: Assistant Professor, Department in Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

2: Associate Professor in Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

3: Research Associate in Center for Research, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

4: Professor in Physiology, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

5: Associate Professor, Department of Community Medicine, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry

6: Professor in Biochemistry, Bharath Medical College and Hospital, Chennai and Affiliated to BIHER

***Corresponding Author: Dr. Naveen Kumar. C: E Mail: navin.mmb@gmail.com**

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ABSTRACT

Nipah virus (NiV) is belongs to genus of Henipavirus, which is a zoonotic and deadly virus with a high mortality rate that has affected many of the countries in the past and present. According to the Centers for Disease Control and Prevention (CDC), many economically deprived countries such as Africa and South Asia are also at high risk for future outbreaks. The first case of NiV was reported in 1998 at Malaysia and almost two decades later, the first case was reported in India at 2001. As many developing countries are not properly equipped to fight the infection and the vaccine against NiV, it is vital to properly educate the health systems. The aim of this review is to provide epidemiological conditions as well as to understand the presentation, transmission routes and the various new diagnostic methods and prevention of this deadly virus.

Keywords: Nipah virus (NiV), Centers for Disease Control and Prevention (CDC), Mode of Transmission

INTRODUCTION

The first case of Nipah virus (NiV) infection was initially reported in September 1998 near Ipoh, West Malaysia. Over the several months, several clusters of infections were reported over various regions such as near Sikamet and Bukit Pelandok **[1]**. Four patients were tested primarily, assumed to be Japanese B Encephalitis was shown positive. Many of them died, the assessed victims were reports of sick pigs with a barking cough. The clinical conditions of Nipah virus were not typical of Japanese B Encephalitis **[2-3]**. The virus was first isolated and classified based on its appearance at March 1999 and grouped in a Paramyoviridae virus **[4]**. The second outbreak occurred in India 2001 in Meherpur, Bangladesh, and Siliguri, West Bengal, India. Laboratory investigations were failed to properly identify the organisms. After several decades, the outbreak in 2014, the Philippines National Epidemiology Center was screened the causative agent of deaths in Mindanao, Philippines. The investigation was found positive for antibodies IgM against NiV in 03 patients. A fatality rate about 53% was observed during that particular outbreak in Philippines and 82% had acute encephalitis were reported **[5]**. Last year at May 2018, an major outbreak of NiV was reported in the south India state of Kerala. The epidemic spread through human-to-human transmission by droplet infection. About 17 deaths by NiV were announced by the State of Kerala at the end of June 2018 **[6]**.

The National Centre for Disease Control India (NCDC) stated that a suspected case of a person from a community affected by a NiV infection, based on the following clinical conditions, such as;

a) Acute Fever with new onset of altered mental status or seizure and/or
b) Acute Fever with severe headache and/or
c) Acute Fever with Cough or shortness of breath

A confirmed case based on the laboratory investigations of Nipah infection by polymerase chain reaction (PCR). Various samples were tested such as respiratory secretions (throat swab), urine and cerebrospinal fluid **[7]**. Current decade threatens about the NiV, according to the Centers for Disease Control and Prevention (CDC) many economically privileged countries had more chance of spread of this disease due to the limited resources and infrastructure and to prevent. To avoid major fatality rate by proper understanding of the previous outbreaks and setting up of appropriate protocols which can helps to protect against future occurrences of NiV. The outbreaks of historical review of the NiV for past several decades explained in the **Table 1**.

Table 1

S. No	Month -Year	Country	No. of Cases	No. of Deaths	Fatality Rate in %	Mode of Transmission	Source
1	June-1999	Malaysia	276	106	38	Sick Pig to Humans	Direct Contact
2	Feb-2001	India (West Bengal)	66	45	68	Human to Human	Air Droplets
3	May-2001	Bangladesh	13	09	69	Fruit Bats to Human	Contaminated Fruit
4	Jan-2003	Bangladesh	12	08	67	Fruit Bats to Human	Saliva of Fruit bat
5	Jan-2004	Bangladesh	31	23	74	Fruit Bats to Human	Urine of Fruit bat
6	Apr-2004	Bangladesh	36	27	75	Human to Human	Air Droplets
7	Mar-2005	Bangladesh	12	11	92	Human to Human	Air Droplets
8	Feb-2007	Bangladesh	07	03	43	Human to Human	Air Droplets
9	Apr-2007	Bangladesh	11	06	96	Human to Human	Air Droplets
10	Apr-2007	India (West Bengal)	05	05	100	Human to Human	Air Droplets
11	Feb-2008	Bangladesh	04	04	100	Human to Human	Air Droplets
12	Apr-2008	Bangladesh	07	05	71	Human to Human	Air Droplets
13	Jan-2009	Bangladesh	04	01	75	Human to Human	Air Droplets
14	Mar-2010	Bangladesh	16	14	88	Human to Human	Air Droplets
15	Feb-2011	Bangladesh	44	40	91	Human to Human	Air Droplets
16	Feb-2012	Bangladesh	12	10	83	Human to Human	Air Droplets
17	Apr-2013	Bangladesh	24	21	88	Human to Human	Air Droplets
18	Apr-2014	Philippines	17	09	53	Human to Human	Air Droplets
19	Mar-2014	Bangladesh	18	09	50	Human to Human	Air Droplets
20	Feb-2015	Bangladesh	09	06	67	Human to Human	Air Droplets
21	May-2018	India (Kerala)	13	11	85	Fruit Bats to Human	Contaminated Fruit
22	June-2019	India (Kerala)	86	17	20	Human to Human	Air Droplets
Total			723	390	54		

METHOD

The present article based on collective study of previous publications about NiV reviews on Google Scholar. This study explains the consolidate details about the NiV.

NIPAH Virus?

The history of NiV starts from March 1999; University of Malaysia first carried out analysis of the virus. The virus was isolated and studied from the cerebrospinal fluid sample of a patient suffering from encephalitis. The name origination of the Nipah virus was proposed from the location of the Kampung Sungai Nipah at Malaysia, were the first source of the sample obtained **[4]**. Nipah virus characteristic were similar to Paramyxoviridae virus, it has been identified by electron microscopy. The antibody activity of the other Paramyxovirus, were shown to be negative reactivity to NiV. NiV was seen circular, pleomorphic about 1900 nm with various proteins such as Matrixprotein (M), Polymersaeprotein (L), Glycoprotein (G), Fusionprotein (F), Nucleoprotein (N) and Phosphoprotein (P). The pleomorphic factors help to change the spherical to filamentous form. Two major strains were one at NiV Malaysia and another one at NiV Bangladesh **[8]**.

Transmission of NIV?

The main reservoir of NiV is *Pteropus*, Fruit bats **[9-11]**. The investigations surprise was the infected bats have not show any symptoms of the disease by NiV. Greater than 23 species of fruit bats have been found to be reservoirs of NiV. The infected fruit bats were act as a host for the virus and which naturally infects the dogs, horses, pigs, cats, including humans **[5, 12]**. Urine or saliva of the infected host was considering the mode of transmission. Other than the fruit bat guinea pigs, ferrets, and African green monkeys are also act as host for NiV. NiV had a special character such as ephrin B2/B3 molecules which helps the virus to enter the host cell in a wide tropism, while comparing the other paramyxoviruses **[13]**.

Humans were infected by bats to human through an intermediate animal host or direct bat-to-human transmission. Bangladesh and India of several outbreaks reveals the Human-to-human transmissions cases **[14-15]**. Various mode of transmission explain in the picture below **Figure 1**.

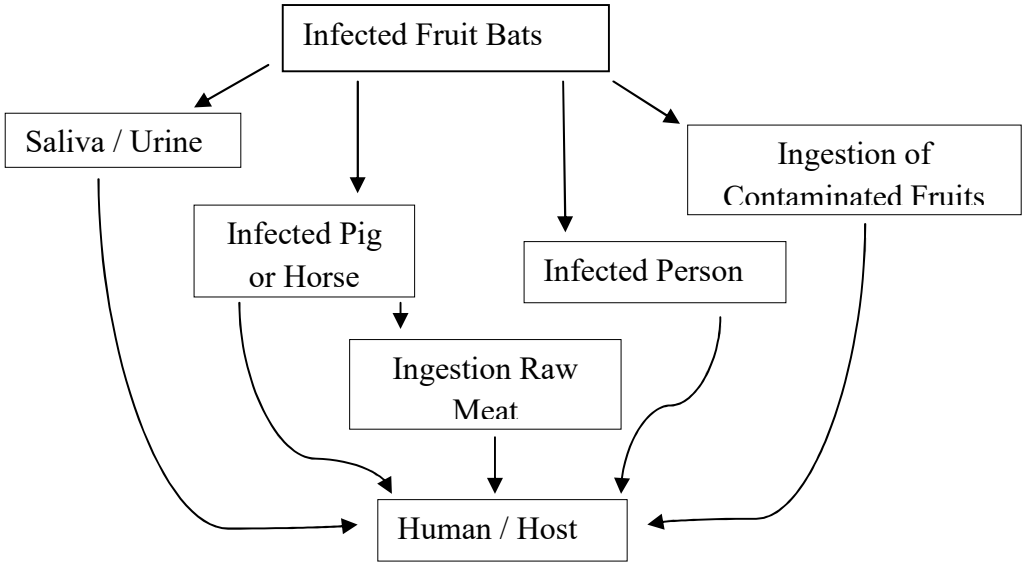

Figure 1: Various mode of Transmission of NiV

Clinical Conditions of NIV?

The incubation period for NiV varies from 4-21 days **[1]**. The nonspecific symptoms like sudden onset of fever, headache, nausea, vomiting and myalgia were reported. The Common symptoms like fever, altered mental status, severe weakness, headache, respiratory distress, cough, vomiting, muscle pain, convulsion, diarrhea. About very few cases were reported meningismus. Severe neurological symptoms had occurred in 60% of cases, the infected patients after the symptomatic.

Nipah encephalitis was also reported about 20% cases. The nipah encephalitis includes tremors, areflexia, and segmental

myoclonus was also observed. Fatigue and daytime somnolence reported that in 160 cases who survived NiV encephalitis, 7.5% had relapses and 3.4% showed late-onset encephalitis **[17]**.

In general, the case–fatality rate is estimated at 40–75%; however, this rate can vary between outbreaks and can be upto 100%.

Diagnosis of NIV?

A high specificity for diagnosis of NiV was enzyme-linked immunoassay test (ELISA). Polymerase chain reaction (PCR) can also used to find the positivity **[18]**. Microinfarction was the major outcome of the report for 32 autopsies performed at Malaysian outbreak of NiV. Endothelial multinucleated syncytia and Fibrinoid necrosis were seen major blood vessels of the NiV victims **[19]**.

Multiple asymmetric focal lesions were recorded by Magnetic resonance imaging (MRI) scans of patients with NiV **[20-21]**.

Treatment for NIV?

NiV infections persist for last 4 decades but still there is no vaccine availed. The alarming condition was treatment options for patient's only supportive care. Previous study has reported ribavirin therapy shows a lower mortality rate **[22]**. The mortality rate has varied greatly in different outbreaks; in Bangladesh and West Bengal show the high mortality rate of 100 % during the period of 2007-18.

Future Prevention against NIV?

The vaccination for NiV was still a query **[23]** along with there was no proper treatment options were available. Prevention is the major role to save the future by the following points;

1. The public should aware about the severity of the infection and mode of transmission of the infection of NiV.
2. Domestic animals should properly monitor against the infections and not allowed to eat fruits that have been exposed to bats.
3. Bat-to-human transmission mainly taken by the fruits, ingestion of the raw palm sap should be avoided to reduce the risk of NiV.
4. According to the National Centre of Disease Control of India has strongly advised about the hand hygiene by using soap and water after coming into contact with any sick person or domestic animal **[24]**.
5. Past decades international governments and pharmaceutical companies formed the Coalition for Epidemic Preparedness Innovations (CEPI) to fund and promote research to provide the effective vaccine against the disease, during the period of Jan 2017 **[24]**.

CONCLUSIONS

According to the current scenario both developed and developing countries NiV had a major outbreak with high mortality rate. However, Prevention and with proper education about the NiV which prevent the future outbreaks and mortality of the human kind.

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