IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, January 2024

Review Article on Nipah Virus

Dr. Nagaraju Potnuri[1], Ketaki Jadhav[2], Ruturaj Gadhave[3]
Principal, Mandesh Institute of Pharmaceutical Science and Research Centre, Mhaswad, India[1]
UG. Students, Mandesh Institute of Pharmaceutical Science and Research Centre, Mhaswad, India[2,3]

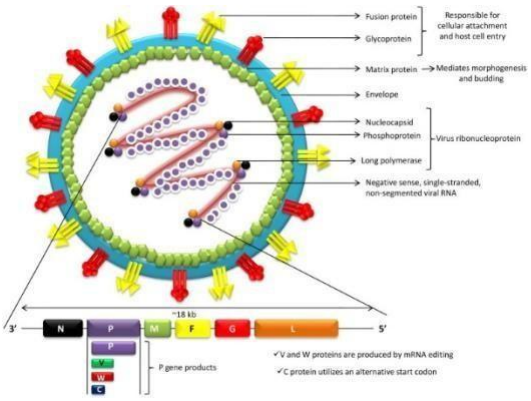
Abstract: *An developing zoonotic disease with a high case fatality rate is the Nipah virus (NiV). From the natural reservoir host (bats), the infection is transferred to humans via intermediate animals like pigs or through foods tainted with bat saliva or urine. There is currently no cure or vaccine for the illness. Therefore, it's crucial to spot outbreaks early and take personal safety precautions to stop the spread of the disease.*

Keywords: Nipah, Virus

I. INTRODUCTION

The Nipah virus, which belongs to the Paramyxoviri- dae family, is the rare zoonotic disease that causes Nipah viral infection. The virus is thought to have its natural hosts in fruit-eating Pteropus bats, also known as flyingfoxes (1). In areas close to the city of Ipoh in the state of Perak, West Malaysia, where pig raising was a significant industry, the first cases appeared in late September 1998. Cases persisted in this area until the beginning of February 1999.In December 1998 and January 1999, a second cluster developed close to Sikamat,a tiny town in the neighboring state of Negri Sembilan. In December 1998, the third and largest cluster emerged close to Bukit Pelandok in the same state (2).
High mortality rates were seen in all of the outbreaks, with the most recent Kerala outbreak recording a cumulative death rate of 91%. Infection quickly progresses inhumans to extreme illness, which results in severe respiratory problems as well as severe encephalitis (3). One of the main reasons why researchers from all around the world are working to create an effective NiV immunization and therapy program is the lack of medicines or antibodies to combat this illness. This review discusses the pathogenesis of the Nipah virus and contains research on the relationship between the host and the infection, any host resistance, and its risk factors (4).

Structure of NIPAH Virus



HISTORY: During a disease outbreak in Kampung Sungai Nipah (Nipah RiverVillage), Malaysia, in 1998, NiV was first discovered. Pigs served as the intermediate hosts in this instance (5). NiV was spread from pigs to people, resulting in 265 human cases and 105 fatalities in Malaysia(6).The majority of those affected were pig farmers (7). Bangladesh and India's West Bengal saw anoutbreak of the Nipah virus in 2001. Following that, Bangladesh reported outbreaks virtually annually. In 2007, India reported a new outbreak. In the twoepidemics, 71 cases and 54 deaths were reported (8).

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, January 2024

CLINICAL SIGNS AND SYMPTOMS:

In Humans:

There have been reports of person-to-person transmission in the Malaysian outbreak, particularly in the households of effected index cases . There were no reports of any major illnesses, encephalitis, or hospital admissions among any of the 300 healthcare professionals (HCWs) who worked in the three hospitals that had cared for 80% of the encephalitis patients in the research (9) , which includedpathology staff. However, third serum samples from 3 nurses who had treated encephalitis patients associated with an epidemic contained Nipah virus IgG antibodies that were positive. One was a staff nurse who also had magnetic resonance imaging (MRI) changes resembling those seen in acute NiV infection, even though the authors came to the conclusion that these were false positives because they had no encephalitis symptoms, no IgM response, and were negative for anti-Nipah virus neutralizing antibodies. She had no prior contact with pigs, butshe had cared for the sick patients, therefore it is likely that she had an asymptomatic or moderate NiV infection.In Bangladesh and India, where multiple outbreaks were caused by person-to-person transmission, the situation was drastically different. Between 2001 and 2007, approximately half of the cases found in Bangladesh involved human-to-human transmission (10). The Faridpur outbreak in 2004 provided the best example of person-to-person transmission, withthe chain of transmission eventually affecting 34 people over 5 generations (11).

In Animals:

Pigs: Grey-headed fruit bats (P. Poliocephalus), huge flying foxes (P. Vampyrus), and domestic pigs are examples of the same species.Nipah virusvaccination did not cause any clinical illness in pteropid bats. Only two swabs—one from the throat and one from the rectal—from one out of eight sick bats showed viral RNA when giant flying foxes were inoculated. Rarely,and only on the seventh day following inoculation, was the Nipah virus successfully isolated from bat tissues. Even when injected bats had some histopathological lesions, no Nipah virus antigen was found to be associated with these lesions, hence it is still unclear whether these lesions were brought on by Nipah virus replication. Despite the fact that most virus neutralizing titres were low, all injected bats seroconverted (12,13)

Epidemiology of animals :

Reservoir host:

Pteropus fruit bats, also referred to as flying foxes, belong to the Pteropodidae family and are the primary reservoir hosts of NiV and HeV. Inbats, neither virus seems to produce a noticeable illness, whether the infection occurs naturally or through experimentation(14).

Host Range:

Additionally, NiV has been demonstrated to infect guinea pigs, hamsters, ferrets, squirrel monkeys, and African green monkeys in experiments. Thefact that NiV employs ephrinB2/B3 molecules as its primary source of ligands contributes to this wide variety of species tropism.

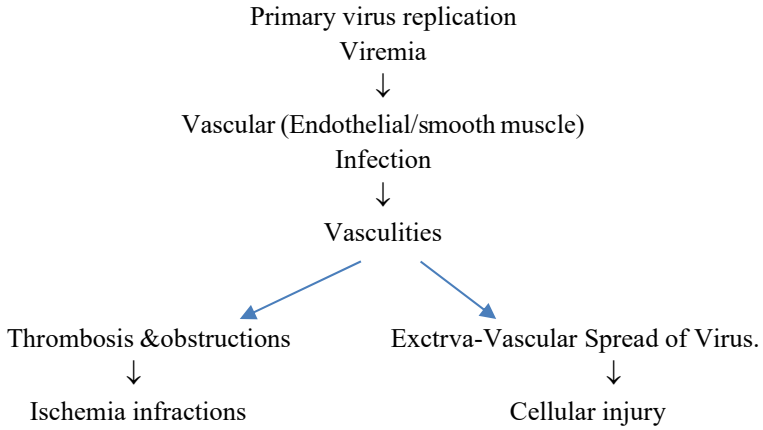
All mammals share highly conserved entry receptors(15).

Pathogenesis of Nipah virus:

NiV diagnosis is possible in epithelial cells in the early stages of infection, particularly in the bronchiole(16). Viral particles that are not alive in humans may be present in the infected CNS, which can cause necrosis. Recent research on animal models suggested that the virus might instantly enter the central nervous system through the olfactory nerve(17).During the later stages of infection, the airway epithelium additionally secretes inflammatorymediators such interleukin granulocyte-colony stimulating issue(18).The virus spreads to the endothelium's cells from the respiratory epithelium. Thevirus might enter the bloodstream as the infection progresses. Multi-organ failure can result from attacks on the brain and other organs in addition to the respiratory, digestive, and excretory systems. Leukocytes can also contract NiV in hamster animal models, which has been reported to have fatal effects(19).

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, January 2024

Etiopathogenesis:



NiV, also known as the Nipah virus, is a contagious illness that is initially spread from animal to human and then from human to human. Pigs and bats can spread this type of illness. The disease can infect humans if they eat fruits that have already been tainted by an infected pig or bat(20).Many fruits, most notably litchisand mangoes, are devoured by people during the summer, especially by kids. It canbe difficult to tell whether fruits on trees were eaten by bats because they may bite them at night and then sell them in the market the next morning(21).

Nipah virus outbreaks (1998-2023)

Sr. No	Year/Month	Country	Location	No. ofcase	No. ofdeaths	Case fatality rate %
1	Sep 1998 - April 1999	Malaysia	Perak,Negeri Semblian State	265	105	39.6
2	Mar-1999	Singapur	Singapur	11	1	9
3	Jan - Feb 2001	India	Siliguri	66	45	68.2
4	Apr-May 2001	Bangladesh	Meherpur	13	9	69.2
5	Jan 2003	Bangladesh	Naogaon	12	8	66.7
6	Jan-April 2004	Bangladesh	Rajbari, Faridpur	67	50	74.6
7	Jan-Mar 2005	Bangladesh	Tangil	12	11	91.7
8	Jan-April 2007	Bangladesh	Kushtia,Naogaon	18	9	50
9	April	India	Nadia	5	5	100
10	Jan 2009	Bangladesh	Gaibanda,Rangpur	4	1	25
11	Jan-Feb 2011	Bangladesh	Comilla,Dinajpur	44	40	90.9
12	Jan_Feb 2014	Bangladesh	13 districts	18	9	50
13	Mar 2014	Philippines	Philippines	17	9	52.9
14	Jan-Feb2015	Banladesh	Faridpur,Magura,Nilphamari	9	6	66.7
15	May 2018	India	Kozhikode and Malappuram	18	17	94.4
16	2019	India	Ernakulum	1	0	0
17	2021	India	Kozhikode	1	1	100
18	2023	India	Kozhikode	6	2	33.3
	Total			578	223	40

Table No. 1

Diagnosis:

In the early stages of the illness, real-time polymerase chain reaction (RT-PCR) andvirus isolation attempts from blood, CSF, urine, and throat swabs should be made. Later, IgG and IgM antibody detection by ELISA might be employed(22).The majority of individuals will have elevated CSF protein and normal blood glucose levels. In individuals with encephalitis, a normal WBC count and normal chemical markers in CSF do not rule out Nipah virus

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, January 2024

infection(23).The National Institute of Virology (ICMR) in Pune, India, recently developed a full-fledged BSL4 lab with all the necessary equipment for diagnosing NiV that can handle any emergency in the nation(24).

Treatment:

Since there are currently no licenced particular antivirals or vaccinations for NiV, treatment is limited to supportive care(25).During previous epidemics, ribavirin and acyclovir were used to treat NiV infection(26).Avoiding direct contact with infected and host animals (fruit bats and pigs) or their secretions, as well as avoiding eating food contaminated by bat saliva or droppings, will help prevent Nipah virus infections. Before eating, fruits or other items from trees that are hometo fruit bats should be thoroughly examined and cleaned.When providing care for apatient who is infected, the appropriate measures should be performed because NiV can spread through respiratory droplets or by direct touch. Frequent hand washing, sanitising with 70% ethanol, and avoiding direct contact with bodily fluids such urine, saliva, and blood should be followed as standard operating practises when working with NiV suspected patients. In impacted locations, surveillance for NiV in humans and reservoir animals should be carried out, which aids in finding(27).

Prevention :

Nipah virus is not preventable with a vaccination(28).Animal facilities should be quarantined if an outbreak of Nipah is detected. Both handling sick animals and caring for sick people require caution. The collection of samples from individuals and animals suspected of having the Nipah virus should be done by trained personnel using normal safety precautions(29).

II. CONCLUSION

A brand-new virus called NiV first appeared precisely 20 years ago, devastating Malaysia's pig farming business and causing high morbidity and death in both humans and animals. NiV is still generating outbreaks in Bangladesh and India. Given the prevalence of the reservoir host Pteropus bat and the discovery of NiV in bats in several nations, there is a considerable chance that outbreaks could spread to new areas.

REFERENCES

[1]. Kulkarni DD, Tosh C, Venkatesh G, Senthil Kumar D. Nipah virus infection: current scenario. Indian J Virol. 2013 Dec;24(3):398–408.
[2]. Tan KS, Tan CT, Goh KJ. 1999. Epidemiological aspects of Nipahvirus Infection. Neurol J South East Asia 4:77– 81.
[3]. Centers for disease control and prevention Outbreak of Hendra-like virus-Malaysia and Singapore, 1998–1999 MMWR Morb Mortal Wkly Rep, 48 (1999), pp.265–269.
[4]. Halpin, K., Hyatt, A. D., Fogarty, R., Middleton, D., Bingham, J., & Epstein,
[5]. J. H. (2011). Pteropid bats are Confirmed as the reservoir hosts of henipaviruses: A comprehensive experimental study of virus transmisSion. American Journal of Tropical Medicine and Hygiene, 85, 946–951.
[6]. WHO | Nipah virus infection [Internet]. World Health Organizations. 2018 [cited 2018 May 27].
[7]. Nipah Virus Case Study [Internet]. Nipah Virus Case Study | One Health Network South East Asia. [cited 2018 May 27].
[8]. Parashar UD, Sunn LM, Ong F, Mounts AW, Arif MT, Ksiazek TG, et al. Case-control study of risk factors for human infection with a new zoonotic paramyxovirus, Nipah virus, during A 1998-1999 outbreak of severe encephalitis in Malaysia. J Infect Dis. 2000 May;181(5):1755–9.
[9]. WHO, Nipah virus outbreaks in the WHO South-East Asia Region [Internet]. World Health Organization. World Health Organization; 2017 [cited 2018 May 27].
[10]. Mounts AW, Kaur H, Parashar UD, Ksiazek TG, Cannon D, Arokiasamy JT,Anderson LJ, Lye MS. 2001. A cohort study of health care workers toAssess nosocomial transmissible of Nipah virus, Malaysia, 1999. J Infect Dis 183:810-813. https://doi.org/10.1086/318822.
[11]. Luby SP, Gurley ES, Hossain MJ. 2009. Transmission of human infection With Nipah virus. Clin Infect Dis 49:1743–1748. https://doi.org/10.1086/ 647951.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, January 2024

[12]. Gurley ES, Montgomery JM, Hossain MJ, Bell M, Azad AK, Islam MR, MollaMA, Carroll DS, Ksiazek TG, Rota PA, Lowe L, Comer JA, Rollin P, Czub M,Grolla A, Feldmann H, Luby SP, Woodward JL, Breiman RF. 2007. Person To-person transmission of Nipah virus in a Bangladeshi community.Emerg Infect Dis 13:1031–1037. https://doi.org/10.3201/eid1307.061.

[13]. Halpin K, Hyatt AD, Fogarty R, et al. Pteropid bats are confirmed as the reservoir hosts of henipaviruses: a comprehensive experimental study of virus transmission. The American journal of tropical medicine and hygiene. 2011;85:946–951. [PMC free article] [PubMed] [Google Scholar].

[14]. Middleton DJ, Morrissy CJ, van der Heide BM, et al. Experimental Nipah virus infection in pteropid bats (Pteropus poliocephalus). J Comp Pathol. 2007;136:266–272. [PubMed] [Google Scholar].

[15]. Wang LF, Mackenzie JS, Broder CC. 2013. Henipaviruses, p 286 –313. InKnipe DM, Howley PM (ed), Fields virology, 6th ed. Lippincott Williams &Wilkins, Philadelphia, PA.

[16]. Negrete OA, Wolf MC, Aguilar HC, Enterlein S, Wang W, Muhlberger E, SuSV, Bertolotti-Ciarlet A, Flick R, Lee B. 2006. Two key residues inephrinB3Are critical for its use as an alternative receptor for Nipah virus. PLoSPathog 2:e7. https://doi.org/10.1371/journal.ppat.0020007.

[17]. Bonaparte MI, Dimitrov AS, Bossart KN, Crameri G, Mungall BA, BishopKA, Choudhry V, Dimitrov DS, Wang LF, Eaton BT, Broder CC. 2005.Ephrin-B2 ligand is a functional receptor for Hendra virus and NipahVirus. Prof Natl Acad Sci USA 102:10652–10657. https://doi.org/10.1073/pnas.0504887102.

[18]. Ochani, R. K., Batra, S., Shaikh, A., & Asad, A. (2019). Nipah virus-the rising epidemic: A review. Le Infezioni in Medicina, 27(2), 117–127.

[19]. Epstein, J. H., Rahman, S., Zambriski, J., Halpin, K., Meehan, G., Jamaluddin, A. A., et al. (2006). Feral Cats and risk for Nipah virus transmission Emerg Infect Dis., 12, 1178–1179.

[20]. Paton, N. I., et al. (1999). Outbreak of Nipah-virus infection among abattoir workers in Singapore. The Lancet., 354, 1253–1256.

[21]. K.E.Lee,T.Umapathi,C.B.Tan,H.T.Tjia,T.S.Chua,H.M.Oh,etal. (1999) The neurological manifestations of Nipah virus encephalitis, a novel paramyxovirus AnnNeurol.46, 428–432.

[22]. Epstein, J. H., Rahman, S., Zambriski, J., Halpin, K., Meehan, G., Jamaluddin, A. A., et al. (2006). Feral Cats and risk for Nipah virus transmission Emerg Infect Dis., 12, 1178–1179.

[23]. Chua, K. B., Bellini, W. J., Rota, P. A., Harcourt, B. H., Tamin, A., Lam, S. K., et al. (2000). Nipah virus: A recently emergent deadly paramyxovirus Science., 288, 1432–1435.

[24]. Islam MMZ, Rahman MM. Nipah virus Infection: A fatal Emerging disease. Northern International Medical College Journal. 2016;7(2):146.

[25]. Hossain MJ, Gurley ES, Montgomery JM, Bell M, Carroll DS, Hsu VP, et al. Clinical presentation of nipah virus infection in Bangladesh. Clin Infect Dis. 2008 Apr 1;46(7):977–84.

[26]. Kulkarni DD, Tosh C, Venkatesh G, Senthil Kumar D. Nipah virus infection: current scenario. Indian J Virol. 2013 Dec;24(3):398–408.

[27]. World Health Organization. Emergencies preparedness, response.Nipah virus—India. 2018. http://www.who.int/csr/don/07-august-2018-nipah-virus- india/en/. Accessed August 10, 2018.

[28]. Bellini WJ, Rota P, Parashar UD. Zoonotic paramyxoviruses. In:Richman DD, Whitley RJ, Hayden FG, eds. Clinical Virology. 2nd ed.Washington, DC: ASM Press; 2002:845-855.

[29]. World Health Organization. Emergencies preparedness, response.Nipah virus—India. 2018.

[30]. http://www.who.int/csr/don/07-august-2018-Nipah-virus- India/en/. Accessed August 10, 2018.

[31]. Hsu VP. Nipah and Hendra viruses. In: Tabor E, ed. Perspectives in Medical Virology. Emerging Viruses in Human Populations. Volume 16.Netherlands: Elsevier Science Publisher; 2006:179-199.

[32]. M G. Nipah Virus. Tropical Medicine & Surgery. OMICS International. 2013 Jun 20;1(4):1–8.

[33]. Siddique AB, Fardows J, Farhana N, Mazumder M. Nipah Virus: A Public Health Concern. Journal of Enam Medical College. 2016;6(2):101.