

Review on NIPAH Virus

Aniket Jaybhaye, Miss.Priyanka Zendekar, Dr. Gajanan Sanap

Late Bhagirathi Yashwantrao Pathrikar College of Pharmacy, Pathri, Maharashtra, India

Abstract: *Nipah contagion is an acute febrile illness that can beget fatal encephalitis. It's an arising zoonotic paramyxovirus aboriginal to south- east Asia and the western Pacific, and can be transmitted by its primary force of fruit batons, through intermediate beast vectors and by mortal- to- mortal spread. Outbreaks of Nipah contagion encephalitis have passed in Malaysia, Singapore, Philippines, India and Bangladesh, with the most recent outbreak being in Kerala, India in late. Extremely high case casualty rates have been reported from these outbreaks, and to date no vaccines or remedial operation options are available. Combining this with its propensity to present non-specifically, Nipah contagion encephalitis present a grueling opinion that should not be missed in cases returning from aboriginal regions. Raising mindfulness of the epidemiology clinical donation and threat factors of constricting Nipah contagion is vital to honor and manage implicit outbreaks of this complaint in the UK.*

Keywords: Nipah contagion

REFERENCES

- [1]. NIPAH Virus Infection – A Review Article Jacob K Jacob,a Shiji K Jacob,b Bhagyanath Ta a. Department of Medicine, Government Medical College Ernakulam;bb. Department of Pediatrics, Government Medical College, Ernakulam* REVIEW ARTICLE KERALA MEDICAL JOURNAL Published on 29th June 2018
- [2]. Nipah virus, an emerging zoonotic disease causing fatal encephalitis Author: Ali M AlamA (3)- Nipah virus outbreak in Malaysia, 1998-1999 Mike Bunning, DVM, MPH
- [3]. Referenc-Lessons from the Nipah virus outbreak in Malaysia Lai-Meng LOOI MD, FRCPath and Kaw-Bing CHUA* MD, FRCPath Department of Pathology, University of Malaya and *National Public Health Laboratory, Ministry of Health, Malaysia
- [4]. Nipah Virus–Another Threat From the World of Zoonotic Viruses Krzysztof Skowron1 , Justyna Bauza-Kaszewska2 , Katarzyna Grudlewska-Buda1, Natalia Wiktorszyk-Kapischke1, Maciej Zacharski3*, Zuzanna Bernaciak1 and Eugenia Gospodarek-Komkowska1 1 Department of Microbiology, Ludwik Rydygier Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun, Bydgoszcz, Poland, 2 Department of Microbiology and Food Technology, Jan and J, edrzej Sniadecki University of Technology in Bydgoszcz, Bydgoszcz, Poland, 3 Department of Biochemistry and Molecular Biology, Wrocław University of Environmental and Life Sciences,
- [5]. Wrocław, Poland
- [6]. Directorate of Health Services <https://dhs.kerala.gov.in> › Ni...PDF Nipah Virus Infection
- [7]. MANUAL ON THE DIAGNOSIS OF NIPAH VIRUS INFECTION IN ANIMALS Food and Agriculture
- [8]. Organization of the United Nations Regional Office for Asia and the Pacific Animal Production and Health Commission for Asia and the Pacific (APHCA) January 2002
- [9]. National Center for Emerging and Zoonotic Infectious Diseases Division of High-Consequence Pathogens and Pathology (DHCPP)
- [10]. Centers for Disease Control and Prevention. CDC twenty four seven. Saving Lives, Protecting People
- [11]. Nipah Virus Infection -Malaysia Experience Aziz Bin Jamaluddin DVM, PhD (Director General) Azri Bin Adzhar DVM, Mphil (Chief epidemiology and Surveillance) Department of Veterinary Services Malaysia, Putrajaya, Malaysia
- [12]. Field H et al. (2001) The natural history of Hendra and Nipah viruses. *Microbes and Infection* 3, 307–314.
- [13]. Rahman SA et al. (2010) Characterization of Nipah virus from naturally Infected Pteropus vampyrus bats, Malaysia. *Emerging Infectious Diseases* 16, 1990–1993.



- [14]. A survey of Nipah virus infection among various risk groups In Singapore K. P. CHAN***, P. E. ROLL IN#, T. G. KS IAZEK#, Y. S. LEO\$, K. T. GOH%, N. I. PATON\$, E. H. SNG" A. E. L ING" " Virology
- [15]. Laboratory, Department of Pathology, Singapore General Hospital, Outram Road, Singapore 169608 # Special Pathogens Branch, Centers for Disease Control and Prevention, Atlanta, USA \$ Communicable Disease Centre, Tan Tock Seng Hospital, Singapore % Quarantine and Epidemiology Department, Ministry of the Environment, Singapore (Accepted 5 August 2001)
- [16]. Paton NI, Leo YS, Zaki SR, et al. Outbreak of Nipah- Virus infection among abattoir workers in Singapore. Lancet 1999; 354: 1253–6
- [17]. Risk Factors for Nipah Virus Infection among Abattoir Workers in Singapore Madeleine H. L. Chew,1,a Paul M. Arguin,4 David K. Shay,4 Kee-Tai Goh,1 Pierre E. Rollin,4 Wun-Ju Shieh,4 Sherif
- [18]. R. Zaki,4 Paul A. Rota,4 Ai-Ee Ling,2 Thomas G. Ksiazek,4 Suok-Kai Chew,3 And Larry J. Anderson4 Institute of Environmental Epidemiology, Ministry Of the Environment, 2 Department of Pathology, Singapore General Hospital, and 3 Epidemiology and Disease Control Department,
- [19]. Ministry of Health, Singapore; 4 Division of Viral and Rickettsial Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia
- [20]. Foodborne Transmission of Nipah Virus, Bangladesh Stephen P. Luby,* Mahmudur Rahman,† M. Jahangir Hossain,* Lauren S. Blum,* M. Mushtaq Husain,† Emily Gurley,* Rasheda Khan,* Be-Nazir Ahmed,† Shafiqur Rahman,† Nazmun Nahar,* Eben Kenah,* James A. Comer,‡ and Thomas G. Ksiazek.
- [21]. Hsu, V.P.; Hossain, M.J.; Parashar, U.D.; Ali, M.M.; Ksiazek, T.G.; Kuzmin, I.; Niezgoda, M.; Rupprecht, C.; Bresee, J.; Breiman, R.F. Nipah virus encephalitis reemergence, Bangladesh. Emerg. Infect. Dis. 2004, 10, 2082–2087
- [22]. Nikolay, B.; Salje, H.; Khan, A.K.M.D.; Sazzad, H.M.S.; Satter, S.M.; Rahman, M.; Doan, S.; Knust, B.; Flora, M.S.; Luby, S.P.; et al. A framework to monitor changes in transmission and epidemiology of emerging pathogens: Lessons from Nipah virus. J. Infect. Dis. 2020, 221, S363– S369.
- [23]. Cortes, M.C.; Cauchemez, S.; Lefrancq, N.; Luby, S.P.; Jahangir Hossain, M.; Sazzad, H.M.S.; Rahman, M.; Daszak, P.; Salje, H.; Gurley, E.S. Characterization of the spatial and temporal distribution of Nipah virus spillover events in Bangladesh, 2007–2013. J. Infect. Dis. 2018, 217, 1390–1394.
- [24]. Luby, S.P.; Rahman, M.; Hossain, M.J.; Blum, L.; Husain, M.M.; Gurley, E.; Khan, R.; Ahmed, B.-N.; Rahman, S.; Nahar, N.; et al. Foodborne transmission of Nipah virus, Bangladesh. Emerg. Infect. Dis. 2006, 12, 1888–1894.
- [25]. Chua KB, Koh CL, Hooi PS, et al. Isolation of Nipah virus from Malaysian Island flying-foxes. Microbes Infect 2002; 4:145–51.
- [26]. Gurley ES, Hegde S, Hossain K, et al. Convergence of humans, bats, trees. And culture in Nipah virus transmission, Bangladesh. Emerg Infect Dis 2017; 14:1446–53.
- [27]. Nahar N, Sultana R, Gurley ES, Hossain MJ, Luby SP. Date palm sap collection: exploring opportunities to prevent Nipah transmission. Ecohealth 2010; 23:196–203.
- [28]. Fogarty R, Halpin K, Hyatt AD, Daszak P, Mungall BA. Henipavirus susceptibility to environmental variables. Virus Res 2008; 132:140–4.
- [29]. The recent Nipah virus outbreak in Bangladesh could be a threat for global public health: A brief report Nazmunnahar1 | Iftekhar Ahmed2 | A. S. M. Roknuzzaman2 | Md. Rabiul Islam2 1Department of Sociology, Eden Women's College, National University Bangladesh, Gazipur, Bangladesh 2 Department of Pharmacy, University of Asia Pacific, Dhaka, Bangladesh
- [30]. Kumar S. Inadequate research facilities fail to tackle mystery disease. BMJ. 2003;326:12.
- [31]. A short communication of Nipah virus outbreak in India: An urgent rising concern Olivier Uwishema a,b,c,* , Jack Wellington a,d, Christin Berjaoui a,e , Kamasi Olivia Muoka a,f , Chinyere Vivian Patrick Onyeaka g , Helen Onyeaka h a Oli Health Magazine Organization, Research and Education, Kigali, Rwanda b Clinton Global Initiative University, New York, USA c Faculty of Medicine, Karadeniz Technical University, Trabzon, Turkey d Faculty of Medicine, Cardiff University School of Medicine, Cardiff University, Cardiff, UK e Faculty of Medicine and Surgery, Beirut Arab University, Beirut, Lebanon f

Department of Medical Laboratory Science, University of Calabar, Calabar, Nigeria g Department of Emergency Medicine, Watford General Hospital, West Hertfordshire Teaching Hospitals NHS Trust, Watford, United Kingdom h School of Chemical Engineering, University of Birmingham, Edgbaston, Birmingham.

- [32]. World Health Organization. Nipah virus outbreaks in the WHO South-East Asia Region. SEARO.
- [33]. V.A. Arankalle, B.T. Bandyopadhyay, A.Y. Ramdasi, R. Jadi, D.R. Patil, M. Rahman, M. Majumdar, P.S. Banerjee, A.K. Hati, R.P. Goswami, D.K. Neogi, A.C. Mishra, Genomic characterization of Nipah virus, West Bengal, India, *Emerg. Infect. Dis.* 17 (5) (2011) 907–909.
- [34]. World Health Organization <https://www.who.int> › ... › Item Nipah Virus Infection – India
- [35]. Weekly Communicable Disease Threats Report, Week 38, 17 – 23 September 2023 European Centre for Disease Prevention and Control, Solna, Sweden
- [36]. Lee, B., Ataman, Z. A. & Jin, L. Evil versus ‘eph-ective’ use of ephrin-B2. *Nat. Struct. Mol. Biol.* 15, 540–542 (2008).
- [37]. K. S. et al. The C, V and W Proteins of Nipah Virus Inhibit Minigenome Replication. *The Journal of general virology* vol. 89, 1300-1308 (2008).
- [38]. Chua, K. B. et al. Nipah Virus: A Recently Emergent Deadly Paramyxovirus. *Science* 288, 1432–1435 (2000).
- [39]. Liu, Y. C., Grusovin, J. & Adams, T. E. Electrostatic Interactions between Hendra Virus Matrix Proteins Are Required for Efficient Virus-Like-Particle Assembly. *J. Virol.* 92, e00143-18 (2018).
- [40]. Cox, R. M. & Plemper, R. K. Structure and organization of paramyxovirus particles. *Curr. Opin. Virol.* 24, 105–114 (2017).
- [41]. Wong, J. J. W. et al. Monomeric ephrinB2 binding induces allosteric changes in Nipah virus G that precede its full activation. *Nat. Commun.* 8, 1–11 (2017).
- [42]. Avanzato, V. A. et al. A structural basis for antibody-mediated neutralization of Nipah virus reveals a site of vulnerability at the fusion glycoprotein apex. *Proc. Natl. Acad. Sci.* 116, 25057–25067 (2019)
- [43]. Ranadheera, C. et al. The interaction between the Nipah virus nucleocapsid protein and phosphoprotein regulates virus replication. *Sci. Rep.* 8, 15994 (2018).
- [44]. Watkinson, R. E. & Lee, B. Nipah virus matrix protein: expert hacker of cellular machines. *FEBS Lett.* 590, 2494–2511 (2016).
- [45]. Looi, L.M.; Chua, K.B. Lessons from the Nipah virus outbreak in Malaysia. *Malays J Pathol* 2007, 29, 63–67.
- [46]. Luby, S.P. The pandemic potential of Nipah virus. *Antiviral. Res.* 2013, 100, 38–43.
- [47]. Paton, N.I.; Leo, Y.S.; Zaki, S.R.; Auchus, A.P.; Lee, K.E.; Ling, A.E.; Chew, S.K.; Ang, B.;
- [48]. Rollin,P.E.;Umapathi, T.; et al. Outbreak of Nipah-virus infection among abattoir workers in Singapore. *Lancet* 1999,354, 1253–1256
- [49]. Mohd Nor, M.N.; Gan, C.H.; Ong, B.L. Nipah virus infection of pigs in peninsular Malaysia. *Rev. Sci. Tech.* 2000, 19, 160–165.
- [50]. Luby, S.P.; Rahman, M.; Hossain, M.J.; Blum, L.S.; Husain, M.M.; Gurley, E.; Khan, R.; Ahmed,B.N.; Rahman, S.; Nahar, N.; et al. Foodborne transmission of Nipah virus, Bangladesh. *Emerg. Infect. Dis.* 2006, 12, 1888–1894.
- [51]. Hsu, V.P.; Hossain, M.J.; Parashar, U.D.; Ali, M.M.; Ksiazek, T.G.; Kuzmin, I.; Niezgoda, M.; Rupprecht, C.;Bresee, J.; Breiman, R.F. Nipah virus encephalitis reemergence, Bangladesh. *Emerg. Infect. Dis.* 2004, 10,2082–2087.
- [52]. Gurley, E.S.; Montgomery, J.M.; Hossain, M.J.; Bell, M.; Azad, A.K.; Islam, M.R.; Molla, M.A.; Carroll, D.S.; Ksiazek, T.G.; Rota, P.A.; et al. Person-to-person transmission of Nipah virus in a Bangladeshi community. *Emerg. Infect. Dis.* 2007, 13, 1031–1037.
- [53]. Clayton, B.A.; Middleton, D.; Bergfeld, J.; Haining, J.; Arkinstall, R.; Wang, L.; Marsh, G.A. Transmission routes for nipah virus from Malaysia and Bangladesh. *Emerg. Infect. Dis.* 2012, 18, 1983–1993.

- [54]. Arunkumar, G.; Chandni, R.; Mourya, D.T.; Singh, S.K.; Sadanandan, R.; Sudan, P.; Bhargava, B.; Nipah Investigators, P.; Health Study, G. Outbreak Investigation of Nipah Virus Disease in Kerala, India, 2018. *J. Infect. Dis.* 2019, 219, 1867–1878.
- [55]. Ochani, R. K., Batra, S., Shaikh, A., & Asad, A. (2019). Nipah virus-the rising epidemic: A review. *Le Infekzioen in Medicina*, 27(2), 117–127.
- [56]. Parashar, U. D., et al. (2000). 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. *The Journal of Infectious Diseases.*, 181, 1755–1759.
- [57]. Paton, N. I., et al. (1999). Outbreak of Nipah-virus infection among abattoir workers in Singapore. *The Lancet.*, 354, 1253–1256.
- [58]. 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.
- [59]. 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.
- [60]. Sazzad HM, Luby SP, Stroher U et al. Exposure-based screening For Nipah virus encephalitis, Bangladesh. *Emerg Infect Dis* 2015;21:349-51
- [61]. Sazzad HM, Hossain MJ, Gurley ES et al. Nipah virus infection Outbreak with nosocomial and corpse-to-human transmission, Bangladesh. *Emerg Infect Dis* 2013;19:210–17.
- [62]. Public Health England. Rare and Imported Pathogens Laboratory (RIPL) PHE Microbiology Services Porton Specimen Referral Guidelines and Service User Manual. PHE, 2014. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/367149/RIPL_user_manual_PHE_Version.pdf [Accessed 17 June 2022]
- [63]. Lim CC, Lee WL, Leo YS et al. Late clinical and magnetic resonance Imaging follow up of Nipah virus infection. *J Neurol Neurosurg Psychiatry* 2003;74:131–3.
- [64]. McEntire CRS, Song KW, McInnis RP et al. Neurologic manifestations of the World Health Organization's list of pandemic and Epidemic diseases. *Front Neurol* 2021;12:634827.
- [65]. Anam AM, Ahmad J, Huq SMR, Rabbani R. Nipah virus encephalitis: MRI findings. *J R Coll Physicians Edinb* 2019;49:227–8.
- [66]. Ng BY, Lim CC, Yeoh A, Lee WL. Neuropsychiatric sequelae of Nipah virus encephalitis. *J Neuropsychiatry Clin Neurosci* 2004; 16:500–4.
- [67]. Ambat, A.S.; Zubair, S.M.; Prasad, N.; Pundir, P.; Rajwar, E.; Patil, D.S.; Mangad, P. Nipah virus: A review on epidemiological characteristics and outbreaks to inform public health decision making. *J. Infect. Public Health* 2019, 12, 634–639.
- [68]. Abdullah, S.; Tan, C.T. Henipavirus encephalitis. *Handb. Clin. Neurol.* 2014, 123, 663–670
- [69]. Paton, N.I.; Leo, Y.S.; Zaki, S.R.; Auchus, A.P.; Lee, K.E.; Ling, A.E.; Chew, S.K.; Ang, B.; Rollin, P.E.; Umapathi, T.; et al. Outbreak of Nipah-virus infection among abattoir workers in Singapore. *Lancet* 1999, 354, 1253–1256.
- [70]. Freiberg, A.N.; Worthy, M.N.; Lee, B.; Holbrook, M.R. Combined chloroquine and ribavirin treatment does not prevent death in a hamster model of Nipah and Hendra virus infection. *J. Gen. Virol.* 2010, 91, 765–772.
- [71]. Dawes, B.E.; Kalveram, B.; Ikegami, T.; Juelich, T.; Smith, J.K.; Zhang, L.; Park, A.; Lee, B.; Komeno, T.; Furuta, Y.; et al. Favipiravir (T-705) protects against Nipah virus infection in the hamster model. *Sci. Rep.* 2018, 8, 7604
- [72]. Bossart, K.N.; Geisbert, T.W.; Feldmann, H.; Zhu, Z.; Feldmann, F.; Geisbert, J.B.; Yan, L.; Feng, Y.R.; Brining, D.; Scott, D.; et al. A neutralizing human monoclonal antibody protects african green monkeys from Hendra virus challenge. *Sci. Transl. Med.* 2011, 3, 105ra103.
- [73]. Pallister JA et al. (2013) Vaccination of ferrets with a recombinant G glycoprotein subunit vaccine provides protection against Nipah virus disease for over 12 months. *Virology Journal* 10, 237.
- [74]. Yoneda M et al. (2013) Recombinant measles virus vaccine expressing the Nipah virus glycoprotein protects against lethal Nipah virus challenge. *PLoS ONE* 8, e58414



- [76]. Walpita P et al. (2017) A VLP-based vaccine provides complete protection against Nipah virus challenge following multiple-dose or single-dose vaccination schedules in a hamster model. *Vaccines* 2, 21.
- [77]. Aditi and M. Shariff Department of Microbiology, Guru Teg Bahadur Hospital, Delhi, India and Department of Microbiology, Vallabhbhai Patel Chest Institute, Delhi, India
- [78]. Mazzola, L.T.; Kelly-Cirino, C. Diagnostics for Nipah virus: A zoonotic pathogen endemic to Southeast Asia. *BMJ Glob. Health* 2019, 4, e001118.
- [79]. Sazzad, H.M.; Hossain, M.J.; Gurley, E.S.; Ameen, K.M.; Parveen, S.; Islam, M.S.; Faruque, L.I.; Podder, G.; Banu, S.S.; Lo, M.K.; et al. Nipah virus infection outbreak with nosocomial and corpse-to-human transmission, Bangladesh. *Emerg. Infect. Dis.* 2013, 19, 210–217.
- [80]. Luby, S.P.; Rahman, M.; Hossain, M.J.; Blum, L.S.; Husain, M.M.; Gurley, E.; Khan, R.; Ahmed, B.N.; Rahman, S.; Nahar, N.; et al. Foodborne transmission of Nipah virus, Bangladesh. *Emerg. Infect. Dis.* 2006, 12, 1888–1894.
- [81]. Nipah Virus: Past Outbreaks and Future Containment Vinod Soman Pillai , Gayathri Krishna and Mohanan Valiya Veettil