Communication

Highlighting the Insights Surrounding the Recent Nipah Virus Outbreak in Kerala in 2023

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Highlighting the Insights Surrounding the Recent Nipah Virus Outbreak in Kerala in 2023

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Abstract: The recent outbreak of Nipah virus in India in 2023 had affected the Kozhikode district in Kerala, with a total of 6 confirmed cases and 2 deaths. The source of the outbreak was traced to fruit bats that contaminated date palm sap, a common drink in the region. The outbreak was contained by rapid detection, isolation, and contact tracing of the cases, as well as public health education and social distancing measures. It also highlighted the need for improved surveillance, diagnostics, and therapeutics for Nipah virus. This letter highlights the latest insights gained from the epidemiological, clinical, and laboratory investigations of the outbreak.

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Dear Editor,

In the southern region of India's Kerala state, an alarming outbreak had occurred in 2023, stemming from the bat-borne Nipah virus. This formidable pathogen had caused six infections and two deaths in Kozhikode district, Kerala, since its first detection in late August 2023. The state health department had alerted the public, initiated surveillance, and tested samples for confirmation. The Kerala Health Minister convened an emergency meeting to implement Nipah protocols and prepare an isolation facility. More than 700 people, including healthcare workers, were tested for potential exposure. The index case, whose infection source is unknown, developed pneumonia and ARDS and died shortly after hospitalization. The other five cases were his close contacts, including two relatives and three hospital contacts. One of them, who visited the same hospital as the index case, also died of pneumonia. Up to September 2023, 1288 contacts of the confirmed cases were been identified and quarantined for 21 days [1–3]. The remaining four cases were clinically stable.

As a response to this emerging health crisis, state authorities took the proactive step of closing select educational institutions, offices, and public transportation networks. They swiftly implemented "containment zones," leading to the closure of schools. Also, close monitoring of 76 individuals who had contact with the infected was done to detect early signs of the disease and mobilized 19 core committees and multiple central multi-disciplinary teams to coordinate various response measures [1]. Laboratory testing of suspected cases and environmental and animal samples was conducted at four different facilities, but no animal samples tested positive for Nipah virus. Emergency departments, isolation rooms, ICU beds, and ventilators were prepared to handle and treat suspected and confirmed cases. Dedicated ambulances were used for patient transport. Remarkably, this is the fourth encounter Kerala has had with Nipah virus within a mere span of five years, with the most recent outbreak prior to this one occurring in 2021 and the most devastating outbreak recorded in 2018, witnessing 18 laboratory-confirmed cases and five suspected cases, ultimately resulting in the tragic loss of 17 lives [1].

The first documented instance of Nipah virus which is classified as an RNA virus of the Paramyxoviridae family, was more than two decades ago in 1998, leading to 265 cases and a harrowing 105 fatalities., when it surfaced during an outbreak among pig farmers in Malaysia. In a matter of months, the virus had traversed borders, infecting individuals in Singapore via infected pigs, culminating in nearly 300 cases and over 100 fatalities, with a mortality rate exceeding 50% [2]. In 2001, the virus again resurfaced in Bangladesh and India, where it continues to sporadically incite

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outbreaks. The precise circumstances surrounding the transmission of the virus from bats to humans in the current Kerala outbreak remain the subject of ongoing scientific scrutiny. The proportion of asymptomatic Nipah virus infections varies between outbreaks, ranging from 17% to 45% [1]. However, when the virus manifests with a spectrum of clinical symptoms, including fever, vomiting, respiratory distress, encephalitis, intense headaches, disorientation, drowsiness, and confusion and cerebral inflammation, all of which contribute to its menacing nature. In some cases, patients develop concurrent chest infections. While the primary reservoir for this virus is fruit bats, it has also demonstrated its ability to infect domestic animals such as pigs and, perturbingly, humans. Transmission occurs predominantly through contact with bodily fluids originating from infected animals or individuals.

The Nipah virus strain observed in India and Bangladesh markedly differs from the one that initially emerged in Malaysia. The Malaysian strain primarily transmitted from animals to humans, with minimal inter-human transmission. In stark contrast, the strain responsible for the latest Kerala outbreak is capable of person-to-person transmission and possesses a significantly higher mortality rate. This distinction serves as a stark reminder of the virus's formidable nature. Although Nipah outbreaks typically confine their impact to relatively limited geographic regions, their lethality remains undeniable. This is a cause for concern, as there is a growing apprehension among the scientific community regarding the potential for increased human-to-human transmission, a phenomenon that could potentially augment the virus's overall contagion. The gravity of the situation is underscored by the fact that Nipah virus exhibits a case fatality rate ranging from 40% to 75%, contingent on the specific viral strain. This assessment comes from the expert perspective of Dr. Rajib Ausraful Islam, a veterinary physician renowned for his specialization in bat-borne pathogens at the International Centre for Diarrhoeal Disease Research in Dhaka, Bangladesh [3]. The virus strain identified in Kerala, known as the Indian Genotype or I-Genotype, closely resembles the strain found in Bangladesh, underscoring the importance of comprehending regional differences in Nipah virus dynamics. The stability of the strain circulating in Kerala has remained relatively consistent since its initial appearance over two decades ago in Bangladesh. Nevertheless, there exists a looming concern that future outbreaks may exhibit increased scale and severity should the virus undergo potential mutations that render it milder yet more contagious. Additionally, there is a probability of undetected variants already circulating, as highlighted by Dr. Christopher Broder, an expert in emerging infectious diseases at the Uniformed Services University Medical School [3]. Broder also underscores that the virus's high fatality rate may actually inhibit its rapid spread through populations, as it is not in the virus's best interest to kill all its hosts.

Understanding the mode of transmission is crucial in combating Nipah virus. The Indian flying fox has been pinpointed as the primary host for the virus. This shift in understanding emphasizes the significance of avoiding contact with infected animals, including both fruit bats and intermediary species like pigs. Crucially, the effective management of wildlife residing in close proximity to human communities is integral to preventing Nipah and other bat-borne viruses from spilling over into human populations. Dr. Andrew Breed, a veterinary epidemiologist at the University of Queensland, advocates for comprehensive studies on Hendra virus, a closely related bat-borne pathogen [3]. Such research suggests that stressed infected bats may shed higher quantities of virus particles, thereby elevating the risk of disease transmission to domestic animals and, subsequently, humans. Implementing strategies to restore forested areas, providing a natural habitat for bats, is one proposed approach to maintaining a safe distance between bats and human settlements. Additionally, planting fruit-bearing trees that attract bats but not humans holds promise in averting the contamination of food sources.

As of now, specific drugs for Nipah virus treatment remain elusive, leaving medical care to focus on supportive measures aimed at managing individual symptoms and ensuring patient comfort during their hopeful recovery. Promising treatments have emerged from animal studies, such as the drug ribavirin, which demonstrated a potential reduction in mortality rates, albeit with a need for further human studies. Monoclonal antibodies have shown efficacy in reducing fatalities in green monkeys when administered early during a Nipah virus infection, although their effectiveness in

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human cases remains unverified. In the current outbreak, Indian authorities are taking the proactive step of procuring monoclonal antibodies from Australia. Despite a lack of vaccines against Nipah virus, promising strides are being made, including the testing of an mRNA vaccine in humans by The Indian Council of Medical Research (ICMR), offering hope for future prevention strategies.

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