

DEADLY OUTBREAK

NIPAH VIRUS

Deadly outbreak

Nipah virus

A zoonotic disease that jumped from animals to humans, NiV underlines the fact that anthropogenic causes are driving the new pandemics of the world

Ramya Kannan

The Nipah virus outbreak in Kerala in 2018 was, in retrospect, the first true outbreak people had witnessed in living memory. For a population fed, on screen, with pacy narratives, dizzying tales of disease, horror and death, the 2018 Nipah virus (NiV) outbreak was a horrifying reel-to-real conversion. In the latest outbreak in Kozhikode, six have tested positive and two died. NiV, with its periodic outbreaks in Kerala (fourth, now), has come to symbolise the fear and paralysis that encircle emerging diseases in modern times.

A zoonotic disease that jumped from animals to humans as a consequence of a 'zoonotic spillover', NiV underlines the fact that anthropogenic causes are driving the new pandemics of the world. As these diseases emerge with stunning regularity, with their power to disrupt life, and alter the social fabric, it is incumbent upon those who rule, and those who heal, to acknowledge the dramatically changing disease factors, and the need to address health care more holistically.

'Nipah' comes from the Malaysian village where the first such outbreak was reported in 1998. There were reportedly over 250 cases among farm and workers in slaughter houses. Sayantan Banerjee et al record in *Intractable Rare Disease Research*, in 2019,



PHOTO CREDIT: AFP

that initially encephalitis-like symptoms came to notice, but doctors soon discovered that apart from the neurological manifestations, there was acute respiratory distress syndrome and respiratory failure with multi-organ dysfunction syndrome. Slowly, the world learnt of this new strain of disease where the pathogen was a paramyxovirus, and the vectors included pigs and fruit bats. Since then, India has seen several outbreaks of NiV, mainly in Kerala (2018, 2019, 2021 and 2023), but also in Siliguri in 2001, and a relatively small outbreak in 2007 in Nadia, West Bengal.

No licensed treatment

The closest reservoirs of infection in Kerala are fruit bats, and it is believed that consumption of fruits or berries contaminated with bat spittle might have caused the outbreaks. In other areas – Bangladesh and West Bengal – the consumption of date palm sap, again contaminated by bats, was behind the outbreaks. As far as therapy goes, the Centers for Disease Control and Preven-

tion notes that currently there are no licensed treatments available for the NiV infection. Treatment is limited to supportive care, including rest, hydration and treatment of symptoms as they occur. A few doctors have reported that the anti-viral, Favipiravir, has some activity against NiV. The m102.4 monoclonal antibody is under development and evaluation.

It was when NiV hit Kozhikode district, in Kerala, in 2018, where 21 of 23 persons infected died, that the attention of not merely the health system, but also the public in general was willy nilly drawn towards the virus. Notably, Kerala's handling of the outbreak also provided solid lessons for public health emergencies – isolating patients, contact tracing, quarantining, triaging, implementing infection control protocols, etc.

Human-to-human transmission turned out to be how Patient Zero – Mohammed Salih – of Perambra in Kozhikode contracted his infection. His brother had died just the previous week, and had had similar symptoms.

Health care workers were also affected, even in the recent outbreak, so it can be transmitted via the nosocomial route too. The high mortality rates, along with the risk to health care workers and plausible multimodal transmission, emerged as causes for concern.

It is clear now that a piecemeal handling of the particular outbreak will not do. Larger factors are at play, and a more comprehensive approach towards health care itself is needed. Nations must be cognisant that anthropogenic activity, in terms of rapidly expanding agricultural fields, and destruction of the original habitats of wild animals, and overall pan-seasonal changes wrought by climate change are contributory factors. Increasingly, the One Health approach is being advocated. According to the WHO, 'One Health' is an integrated, unifying approach to balance and optimise the health of people, animals and the environment. It is key to prevent, predict, detect and respond to health threats.

Ideally, it involves mobilising multiple sectors, disciplines and communities at varying levels of society to work together to address root causes and create long-term, sustainable solutions. One Health involves the public health, veterinary, and environmental sectors, and is particularly relevant for control of zoonoses.

Why Nipah virus outbreaks are occurring only in Kerala

With fruit bats positive for Nipah virus antibodies seen in other States, it is likely that Nipah virus infection and deaths may be going undetected in other States while they get picked up in Kerala, especially in Kozhikode district

R. Prasad

Since May 2018 when Kerala reported the first Nipah outbreak in Kozhikode district, there have been three more outbreaks of Nipah virus including the latest one in late-August 2023. For reasons still not known, three of the four Nipah outbreaks in Kerala in 2018, 2021 and 2023 have been in Kozhikode district; the 2019 outbreak was in Ernakulam district. Even five years after the first outbreak, and four outbreaks in all, it is still unclear why three of the four outbreaks have been in Kozhikode district in Kerala. Fruit bats that can cause Nipah virus outbreaks in humans are not restricted to Kozhikode district.

As per a 2021 study, Nipah virus was found to be in circulation in fruit bats (*Pteropus* species) in "many districts" in Kerala. An ongoing survey in 14 States by NIV Pune has found Nipah virus antibodies in fruit bats (*Pteropus medius*) in nine States, including Kerala, and the Union Territory of Pondicherry. While date palm sap was linked to Nipah virus outbreaks in Bangladesh, and pigs acting as intermediate hosts were responsible for Nipah outbreaks in Malaysia, the route of virus transmission from bats to humans has not been clearly established in Kerala.

The four outbreaks in five years may be because the virus has either become endemic in bats in Kerala or is a reflection of Kerala's superior healthcare system that thoroughly investigates undiag-

nosed fever cases for possible Nipah virus infection or both. However, with fruit bats positive for Nipah virus antibodies being found in other States, it is likely that Nipah virus infection and deaths may be going undetected in other States while they get picked up in Kerala, especially in Kozhikode district.

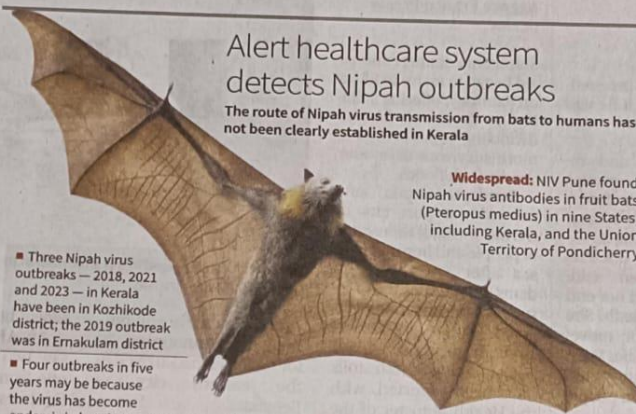
"Whenever we have undiagnosed fever cases, a team involving virologists is formed and we undertake a detailed investigation which helps us diagnose Nipah virus and other new virus outbreaks early. In other States, Nipah cases might be going undetected," says Dr. Anoop Kumar A.S., Director of Critical Care Medicine, North Kerala Cluster, Aster

MIMS Calicut, Kerala. Dr. Kumar played a pivotal role in detecting the Nipah virus outbreak in Kerala in 2018 and 2023.

In the 2019 and 2021 outbreak, there was only a single case without any human-to-human transmission. "Nipah virus infection and deaths might have happened in different parts of India in people with undiagnosed fever, which might have gone undetected. Also, there is no Nipah testing facility anywhere in India except NIV Pune. Only Kerala screens for Nipah virus routinely in a molecular lab in Calicut Medical College," he says. "While other States may not be routinely sending samples for Nipah virus testing, we test

Alert healthcare system detects Nipah outbreaks

The route of Nipah virus transmission from bats to humans has not been clearly established in Kerala



Widespread: NIV Pune found Nipah virus antibodies in fruit bats (*Pteropus medius*) in nine States, including Kerala, and the Union Territory of Pondicherry

- Three Nipah virus outbreaks — 2018, 2021 and 2023 — in Kerala have been in Kozhikode district; the 2019 outbreak was in Ernakulam district

- Four outbreaks in five years may be because the virus has become endemic in bats in Kerala, or due to thorough investigation of undiagnosed fever cases for possible Nipah virus infection or both

- Except in NIV Pune, there is no Nipah virus testing facility anywhere in India. Kerala screens for Nipah virus routinely in a molecular lab in Calicut Medical College

- Patients with unusual symptoms are tested for Nipah virus, the reason why Kerala might be detecting Nipah cases

- Patients who tested positive for Nipah virus in 2023 had only respiratory symptoms not reported anywhere in the world before. Nipah virus detection still became possible due to doctors' high index of suspicion

- In the latest outbreak, a combination — possible index case, clustering of cases, unusual symptoms, and proximity to the 2018 outbreak epicentre — led to testing for Nipah virus

admitted with unusual symptoms about two weeks after the death of the index case. "There was a [possible] index case, clustering and unusual symptoms seen in the contacts. There was a high index of suspicion and that led us to diagnose Nipah virus in 2018," recalls Dr. Kumar. In the latest outbreak, there was a death in another hospital in Kozhikode city on August 30 and four of the family members developed unusual symptoms on September 9 and were admitted two days later at Aster MIMS Calicut. Nipah virus was diagnosed the very next day after admission.

"We noticed a clustering of cases after the death of the person. During a detailed history taking we came to know that the person who died had unusual symptoms. And the family was from a locality quite close (10-15 km) to the 2018 outbreak epicentre. There was a high index of suspicion of a new emerging virus or Nipah due to the combination of a [possible] index case, clustering of cases, unusual symptoms and proximity to the first outbreak epicentre. So we first tested for Nipah virus," he says. At the time the deaths happened in the index case in 2018 and 2023, Nipah virus was not diagnosed. In 2019 and 2021, only a single case was detected (ending in death in 2021 unlike in 2019). This raises the possibility of several people getting infected with Nipah virus and even dying without a diagnosis in other parts of Kerala and other States, especially when only one or a few cases occur, he says.

for Nipah whenever there are cases with unusual symptoms. That might be the reason why Kerala is detecting Nipah cases."

Usually, people with Nipah virus infection present with encephalitic symptoms. "But in the latest outbreak, patients presented with pure respiratory symptoms, not reported anywhere in the world before. "But we could still identify them as Nipah only because we have a high index of suspicion," says Dr. Kumar. In 2018 and in 2023, the index case had died with encephalitis in 2018 and severe pneumonia in 2023 that went unnoticed. In 2018, a cluster formed and Nipah virus was diagnosed among three contacts who were

Evasive nutritional support for TB patients

The Hindu Bureau

Undernutrition is the leading risk factor for TB disease. In 2019, Preeti Sudan, Secretary in the Health Ministry noted in a letter that undernutrition at the population level contributes to 55% of annual TB incidence in India.

A 2022 study noted that 45% of people in India are undernourished, accounting for nearly 1.2 million TB cases each year. Yet, nutrition support became a part of the national TB programme only in April 2018 when Nikshay Poshan Yojana – a direct benefit transfer (DBT) scheme for nutritional support to TB patients – was launched. Under this programme, ₹500 per month is credited into the account of a person with TB for the duration of treatment.

In September 2022, India launched another nutrition support programme called *Nikshay Mitra* to consented TB patients. And in 2022, Tamil Nadu became the first and on-

ly State to launch the Differentiated TB Care programme to reduce the mortality rate among TB patients. Severe undernutrition is one of the three parameters used for triaging TB patients at the time of diagnosis.

During triaging as part of the Differentiated TB Care programme, it became evident that 52% of notified TB patients in Tamil Nadu had undernutrition, and 25% had severe undernutrition. If undernutrition among TB patients is so high even in Tamil Nadu, the situation might be far worse in many northern States which have higher levels of undernutrition in the general population.

All the three initiatives provide nutrition support only to TB patients to reduce mortality and not to the family members also to prevent TB disease. The nutrition status of TB patients at the time of diagnosis is largely a reflection of the family's nutrition level. The 2017 guidance document



Huge: Undernourishment causes nearly 1.2 million TB cases each year in India. AP

on nutritional care and support for patients with TB in India had recommended that the family members are provided with a “food basket as they likely to be food insecure, chronically energy deficient and at high risk of contracting TB”. This is yet to become a reality.

The RATIONS trial in Jharkhand has underscored the importance of providing nutrition support to family

members to prevent TB disease. In the trial, TB disease among household contacts was prevented in 39% (all forms of TB) to 48% (pulmonary TB) through nutritional support.

Nikshay Poshan Yojana

As per the India TB report 2023, of the 2.4 million notified TB cases, only 1.6 million (66%) received at least one month's payment in 2022 un-

der the *Nikshay Poshan Yojana* programme. There has been very little increase in the number of beneficiaries in the last three years. For instance, in 2021, only 62.1% of the 2.1 million notified cases in India received at least one payment. In 2020 too, only 62% of notified TB cases received at least one month payment.

A January 2022 retrospective cohort study carried out during January-September 2019 among 426 patients found that the assistance was not reaching the poorest among the poor who need nutritional support the most due to the lack of basic documents. The study also recorded a delay of 56 days to receive the first instalment. Also, 49% of patients received the last instalment after treatment completion. TB patients perceived the assistance provided under the *Nikshay Poshan Yojana* programme was “insufficient to buy nutritious food throughout the course of treatment”.