Nipah cases rise to 5 in Kerala; 789 contacts kept under watch

Healthcare worker latest to test positive in Kozhikode; State Health Department releases a 'route map' of the two deceased persons detailing their travel history; ICMR to provide monoclonal antibodies for treatment of patients

The Hindu Bureau
KOZHIKODE

A day after Nipah infection was confirmed for the third time in Kozhikode district in Kerala, the number of cases rose to five as a healthcare worker from a private hospital, tested positive on Wednesday.

The State Health Department prepared a contact list of 789 people, linked to the two persons who died due to the infection, and two others under treatment after testing positive for the virus.

The department also released a 'route map' of the two deceased persons detailing their travel history from the day they developed symptoms.

The government has restricted big events in Kozhikode till September 24.

Addressing worries: Health officials handle calls at the District Nipah Control Cell in Kozhikode on Wednesday. THULASI KAKKAT

The Indian Council of Medical Research (ICMR) is expected to provide monoclonal antibodies for treatment by Thursday morning.

Kerala Health Minister Veena George said the cases belonged to the Bangladesh strain, which was comparatively less infectious, but had a high mortality rate of 70%.

According to official sources, 371 contacts of the first victim, a 47-year-old man from Maruthonkara in Kozhikode, are under medical surveillance. Sixty contacts of his nine-year-old son, who is being treated at a hospital, too have been traced. One of his brothers-in-law, a 24-year-old, has 77 contacts.

The contact list of the second victim, a 40-year-old man from Ayancheri, has 281 persons. The condition of the infected persons are reported to be stable. A majority of those on the contact list are under isolation at their homes.

The department has sent 11 more body-fluid samples of suspected patients for lab tests at the National Institute of Virology (NIV), Pune. Currently, 20 people are under observation at two hospitals.

An expert panel of doctors has reportedly said that the 47-year-old victim can be considered as the index patient, from whom the others got infected. The second victim had come in contact with him at a private hospital in the city where the former was undergoing treatment. The first patient died on August 30 and the second patient on September 11.

Chief Minister Pinarayi Vijayan earlier held a meeting of Ministers and top government officials to assess the situation.

Nine gram panchayats have been declared as containment zones in the district.

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Tamil Nadu takes precautionary steps after Nipah outbreak in Kerala

The Hindu Bureau
CHENNAI

Following two deaths due to the Nipah virus in Kerala, Tamil Nadu's Directorate of Public Health and Preventive Medicine has taken precautionary measures in the border districts.

While health teams have been deployed at border checkpoints for screening, surveillance of Acute Encephalitis Syndrome (AES) has been stepped up.

Director of Public Health and Preventive Medicine T. S. Selvavinayagam has asked the Deputy Directors of Health Services to begin screening of passengers from Kerala at the border checkpoints. Health teams should be deployed at the border checkpoints round the clock to screen all symptomatic cases, especially in The Nilgiris, Coimbatore, Tiruppur, Theni, Tenkasi and Kanniyakumari.

Guidelines issued

Issuing guidelines on Wednesday, the Director said the Central Surveillance Unit, National Centre for Disease Control, Ministry of Health and Family Welfare, has declared a Nipah outbreak in Kerala's Kozhikode and Malappuram districts on September 12.

The National Institute of Virology, Pune, was investigating the outbreak. Two deaths due to the suspected Nipah virus infection have occurred in Kozhikode district, and one more patient, a relative of the deceased, is admitted to hospital with similar complaints and suspected to have the infection.


Checks begin: People travelling from Kerala to Tamil Nadu being screened at Cumbum Mettu in Theni.

The Deputy Directors of Health Services have been asked to begin screening of passengers from Kerala at the border checkpoints

The official instructed the Deputy Directors, especially those in districts bordering Kerala, to strengthen surveillance of AES (fever with altered sensorium).

Timely notification

Patients admitted with AES from the bordering districts of Kerala, especially those from Kozhikode and Malappuram, should be followed up on. They should alert government and major private hospitals to the Nipah outbreak and tell the facilities to ensure timely notification of AES cases to the District Surveillance Officers through the Integrated Disease Surveillance Programme-Integrated Health Information Platform portal.

In the advisory for healthcare personnel, the Director said those suspected to have symptoms of the Nipah virus infection should be admitted to the isolation wards at hospitals.

The Directorate outlined the clinical features, the mode of transmission, treatment and preventive measures to be taken.

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Unified approach

An integrated approach to health can prevent zoonotic spillover

Lightning is unlikely to strike the same place twice, but the Nipah virus is again wreaking havoc in Kozhikode, the fourth outbreak of the disease in Kerala over the last five years. Caused by a zoonotic spillover, the transmission of pathogens from animals to humans, the closest reservoir of the virus is fruit bats. With two persons dying of Nipah this week in Kozhikode, and three more persons, two of them relatives of one of the victims, testing positive, and being hospitalised, disturbing memories from the terrifying outbreak of 2018, in which 21 of 23 infected people died, have surfaced. The situation remains very much the same, in terms of treatment options: there is no cure, and supportive care remains the only way to handle Nipah infection even in a hospital setting. Kerala's Health Minister Veena George said hundreds of people on the contact list of the deceased had been put under medical observation. One of them, a nine-year-old child, is on ventilator support. A control room has been opened in Kozhikode to monitor the situation, and all the hospitals in the district would be asked to follow infection control protocols. Sixteen teams have been formed to take forward appropriate containment protocols. A central team has also been sent to Kerala to assist the State government. Neighbouring States have taken preparatory steps to ensure that porous borders do not bring the infection across from Kerala. The State's Chief Minister assured the people via a video message that the State was taking the issue very seriously.

While experiences from the prior outbreaks (2018, 2019, 2021) have given medical teams a toolkit of protocols, across the sectors – management, isolation, containment, and treatment – constant vigil can be the only guard against such outbreaks. The biggest lesson though, from global outbreaks, is likely unlearnt yet. Research has shown that anthropogenic activity has a definite hand to play in zoonotic spillovers. In the case of Nipah, rapid expansion of agricultural activity in original habitat zones of the fruit bats has repeatedly shown up on post-factor analyses. As governments mount strategic efforts to control outbreaks and deaths due to infectious diseases, it is increasingly clear that the State needs to initiate a One Health approach on the way forward. The COVID-19 pandemic has led to a deeper appreciation of the One Health concept, which is an integrated, unifying approach to balancing and optimising the health of people, animals and the environment, with the conviction that humans live in symbiosis and that the health of one impacts that of another significantly.

IAF chief takes delivery of first C-295 transport aircraft in Spain

Dinakar Peri
NEW DELHI

Marking a major revamp of its transport fleet, the Indian Air Force on Wednesday received the first C-295MW transport aircraft from Airbus. IAF chief Air Chief Marshal V.R. Chaudhari formally received symbolic keys to the first aircraft at the Airbus facility in Seville, Spain. The 56 C-295 aircraft will replace the ageing Avro aircraft.

"It's a momentous day for us, the IAF in particular and the nation as a whole, to be receiving the first aircraft which marks the beginning of a new era... where we will be manufacturing a military aircraft in India," the IAF chief said while speaking to pressperson on the sidelines of the handover ceremony.

New bird: ACM V.R. Chaudhari receiving the symbolic keys to the first aircraft at the Airbus facility in Seville. SPECIAL ARRANGEMENT

Joint venture

Under the contract, 16 aircraft will come in fly-away condition from Seville while 40 will be manufactured by Airbus jointly with Tata Advanced Systems Ltd. (TASL). Work is under way to set up the final assembly line (FAL) at Vadodara in Gujarat and the first aircraft manufactured in India will be delivered in September 2026, as reported by *The Hindu* earlier.

"Today, Airbus handed over the first C295 for India in fly-away condition. It comes in transport configuration, equipped with an Indian electronic warfare suite, and will replace the Indian Air Force's ageing Avro-748 fleet. In the next few days, a joint IAF-Airbus crew will fly the aircraft from Seville to Delhi," Airbus Defence and Space said in a statement.

Improved relations

In September 2021, the Defence Ministry signed a ₹22,000-crore deal with Airbus and Space S.A., Spain for procurement of 56 C-295MW transport aircraft to replace the Avro aircraft in service with the IAF.

The first 16 C295s of the 56 aircraft on order will be assembled at the San Pablo Sur site in Seville, Spain, with the second aircraft due to be delivered in May 2024 and the next 14 rolled out at a rate of one per month until August 2025, Airbus said.

"C-295 aircraft deal is valued at around $2.5 billion, and it will significantly impact bilateral relations as well as economic ties between India and Spain," Indian envoy in Spain Dinesh K. Patnaik told *PTI* at the ceremony.

Jean-Brice Dumont, Airbus's Head of Military Air Systems, noted that it was only two years ago that the contract was signed with India, the largest order in the history of the C-295.

Indigenous radar warning receiver and missile approach warning systems made by Bharat Electronics Ltd. (BEL) and counter measure dispensing system made by Bharat Dynamics Ltd. (BDL) have been certified and installed on the first aircraft.

Multi-pronged features

Production of components for the aircraft to be made in India has already started in the Main Constituent Assembly (MCA) facility in Hyderabad and these parts will be shipped to Vadovara FAL, which is expected to be operational by November 2024.

The 56th and final aircraft is expected to be delivered to the IAF by August 2031, the statement said.

The C-295, with a carrying capacity of nine tonnes, can carry up to 71 troops or 50 paratroopers, air-drop cargo, be used for medical evacuation and take off and land on short and unpaved runways, according to Airbus.

Aditya-L1 mission pursues the enigma of space weather

To better understand and predict space weather, ISRO launched the Aditya-L1 satellite in September 2023. Aditya-L1 will observe the sun's energy flow, X-ray radiation, and magnetic storms to generate knowledge of societal relevance. The mission vindicates India's investment in space research

Dibyendu Nandi

On a cold winter night on March 13, 1989, the power grid in Quebec, Canada, went down without warning, plunging the province into darkness. The underground metro railway in the city of Montreal came to a grinding halt and airport operations were disrupted. Down south in the neighbouring United States, nights lit up in beautiful bright aurorae as far south as Texas, which is not used to seeing such spectacles. Several sensors on the space shuttle Discovery started misbehaving. The broadcast of Radio Free Europe over Russia fell silent, giving rise to fears of jammed communications.

More than three decades later, in the first week of February 2022, almost an entire batch of newly launched SpaceX Starlink communication satellites fell out of their orbit unexpectedly, as if sunk by a storm.

Despite the variety of events across continents, all of them have a common cause: bad space weather.

Sun, meet Aditya

On September 2 this year, the Indian Space Research Organisation (ISRO) launched the Aditya-L1 satellite, its first space mission to explore the activities of the sun. After swinging by the earth a few times in increasingly distant orbits, the spacecraft will be boosted towards Lagrange point L1 – a strategic location in space about 1.5 million km from the earth. From here, a spacecraft can continuously observe the sun and monitor the changing local environment, or space weather, just before the earth experiences it – giving us critical tens of minutes of advance warning.

The sun is a massive ball of fiery plasma. Energy is generated by nuclear fusion at its core, where temperatures are as high as 15 million degrees Celsius and the density more than 20-times that of iron. From the centre to the surface of the sun, the temperature drops and energy flows outwards. Inside the sun, the temperature is high enough that atoms are broken up into negatively charged electrons and positively charged ions – the state of matter called plasma. Below the sun's surface lies the convection zone, where heated plasma rises and radiates its energy as sunlight upon reaching the surface. The light from the sun that reaches us sustains life and drives atmospheric processes that govern the earth's climate.

After the solar plasma radiates its energy away from the surface, it cools and sinks back down, much like cyclonic convection in the earth's atmosphere. This twisting, churning motion of plasma within the sun creates vast electric currents and, as a by-product, powerful magnetic fields. This process, known as the solar dynamo, generates dark, earth-sized blotches on the sun's surface known as sunspots, and magnetic loops that rise up like giant arches threading the star's outer atmosphere, the corona.

A storm in space

While the sun's visible surface, or photosphere, is only about 6,000 degrees Celsius hot, the temperature in the sun's corona rises to a million degrees. How does it get so hot – in apparent contradiction to the laws of thermodynamics, which state that heat energy can only flow from a region of higher to lower temperature?

The Aditya-L1 spacecraft is flanked by two halves of the payload fairing of the PSLV C57 mission rocket. ISRO

We know that other novel processes, such as waves rippling along those giant coronal magnetic loops, superhot plasma jets rising from the surface to coronal layers, and a process known as magnetic reconnection, are at the heart of coronal heating. The hot magnetic corona of the sun is also responsible for the supersonic outflow of plasma wind that bathes all planets in the solar system and forms the background space weather. Sometimes that environment can be violently disturbed.

The legs of the magnetic loops in the solar corona are being constantly jostled around by turbulent plasma flows beneath the surface, where they are rooted. These loops, energised by the serpentine motion of the plasma, sustain huge electric currents, and sometimes, in the course of their frenzied dance, they cross each other's path. When the conditions are right, this results in a magnetic reconnection event that destroys the loops. The magnetic energy they shed is harnessed to create the most violent events we witness in our star: a solar flare, with an energy yield that can surpass a 100 billion nuclear bombs.

The energy released in such a solar storm heats the solar atmosphere even further, generating intense X-ray radiation and accelerating charged particles to a nontrivial fraction of the speed of light. The most energetic events can hurl magnetised coronal plasma material into outer space at speeds exceeding a few million kilometres an hour, giving rise to a coronal mass ejection – a space storm that, when directed at the earth, severely perturbs our own space environment.

A new infrastructure dependence

Severe space weather can give rise to geomagnetic storms that create beautiful aurorae on the one hand and cause power-grid failures in high-latitude regions, disrupt communications and GPS navigational networks, affect air-traffic over polar routes, and jam radar signals on the other. They can fry sensitive electronics of satellites and sometimes precipitate catastrophic orbital decays, as in the loss of the Starlink satellites in 2022.

With our increasing dependence on space-based infrastructure, a catastrophic solar storm could result in a trillion-dollar adverse economic impact. Yet we don't yet have the means to accurately forecast severe space weather.

ISRO's Aditya-L1 mission will explore how magnetic fields result in variations in the sun's ultraviolet radiation, which plays a critical role in governing the earth's atmosphere and climate dynamics. It will observe the flow of energy in the sun's outer atmosphere to test competing theories for the heating of the sun's corona. By analysing X-ray radiation, it will seek to understand how violent solar storms are born. Aditya-L1 will also track the early motion of magnetic storms near the sun and monitor the local space environment in its vicinity at Lagrange point L1, the environment that eventually affects the earth.

A national collaboration

Aditya-L1 was originally envisaged as a mission of purely fundamental scientific enquiry. In 2020, ISRO constituted a committee to explore how mission data could be used to extract relevant information for space-weather monitoring and predictions. I chaired that committee; it drafted a set of specific recommendations on onboard intelligence for space weather alerts and supporting data analytics and computational modelling initiatives to create value-added space weather knowledge.

> The most energetic events can hurl coronal plasma material into space at speeds over a few million kilometres an hour, giving rise to a coronal mass ejection – a space storm, which can impact our own space environment

More than 60 scientists from about 20 academic organisations participated in that exercise, and many more scientists, engineers, and students contributed to the mission – exemplifying the national collaborative effort that produced Aditya-L1.

If the mission succeeds, it will be a resounding vindication of India's investment in space science research, which can on the one hand spur fundamental enquiry of our cosmos and on the other generate knowledge of strong societal relevance. Today, we wake up to the weather forecast. The day is not far when we will wake up to space weather forecasts. Not since our first sounding rocket screamed over a remote beach in Thumba have the people of India been so excited about space.

(Dr. Dibyendu Nandi is professor of physics and head of the Centre of Excellence in Space Sciences India at IISER Kolkata. He specialises in understanding and predicting space weather.)

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