

CHANDIPURA VESICULOVIRUS & VIRAL ENCEPHALITIS

Compiled by Rtn Hassan Mayet, Co-Ordinator, RID 3060 Sickle Cell



The Chandipura virus is suspected to have spread across multiple districts in Gujarat, and is believed to be the cause of death of at least 15 children so far.

What do we know about the virus?



WHAT IS CHANDIPURA VESICUROVIRUS?

'Chandipura virus: an emerging human pathogen?' published in *The Lancet* in 2004, the virus is a member of the Vesiculovirus genus of the family Rhabdoviridae. Incidentally this family also includes the rabies virus.

The Chandipura virus, the paper states, was first isolated in 1965, from the blood of two adults with a febrile illness in a village in Nagpur, Maharashtra. The virus is reportedly named after the village it was isolated from. The other instance when the virus was isolated in human beings was in 1980, in Madhya Pradesh from a patient with acute encephalitis, the article says.

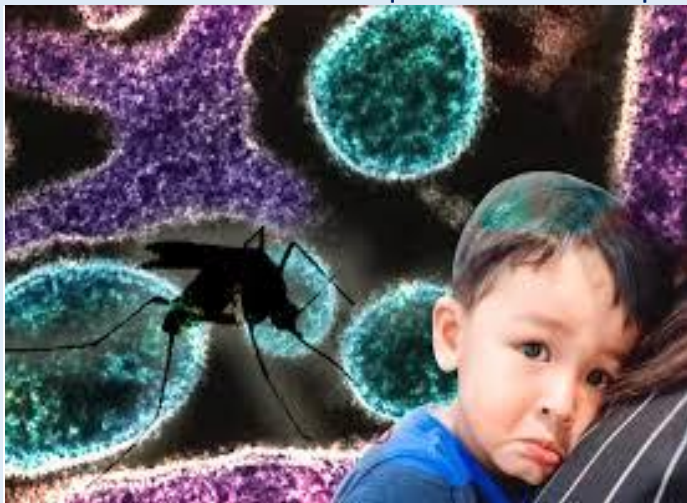
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How is it transmitted?

The virus is vector-borne, with the likely vector believed to be the female Phlebotomine sandfly, insects that are prevalent in the early monsoon period. A 2016 paper, 'Changing clinical scenario in Chandipura virus infection', published in The Indian Journal of Medical Research, also pointed to the role of *Sergentomyia* sandflies. It said several species of mosquitoes replicated and transmitted the virus experimentally, and among the different mosquito species studied, *Aedes aegypti*, (which also transmits dengue), was found to be highly susceptible and could transmit the virus more efficiently than others, under laboratory conditions. However, it said no isolation of the virus from the mosquito had been reported as of then.



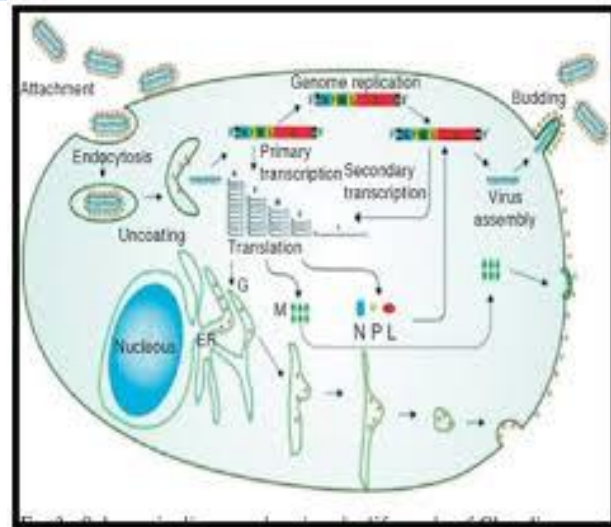
What are the symptoms of the disease?

The Chandipura infection is an encephalitis-causing virus, which means the infection leads to an inflammation or swelling of the brain tissue. Another Lancet paper, 'A large outbreak of acute encephalitis with high fatality rate in children in Andhra Pradesh, India, in 2003, associated with Chandipura virus', said the typical clinical manifestations included:

- rapid onset of fever
- followed by vomiting
- altered sensorium (a change in mental status or consciousness)
- convulsions, diarrhoea
- neurological deficit (examples include an inability to speak, loss of balance, vision changes)
- meningeal irritation (signs may include headaches, neck stiffness, photophobia and seizures).

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Whom does it affect?

The Chandipura virus has been found to mostly affect children under the age of 15, predominantly in rural locations. In the 2003 outbreak, the age of the affected children in Andhra Pradesh was between 9 months and 14 years. Most deaths occurred within 48 hours of admission to the hospital. In the current outbreak in Gujarat, all of the suspected deaths so far have been of children.

How is it treated?



FAST & FURIOUS

- The virus was first isolated and identified in 1965 at Chandipura, village in Nagpur.
- It is transmitted to humans by sandflies that breed in small, dark crevices and cracks of houses.
- The virus was not considered to have an epidemic potential until an outbreak of acute encephalitis among children in Andhra Pradesh in 2003.
- The disease rapidly progresses from influenza-like symptoms to coma, resulting in death in extreme cases.
- Viral encephalitis is a public health concern worldwide.

Unlike dengue, exposure to Chandipura and Japanese encephalitis virus creates herd immunity in the community. Therefore, only a few catch flies while the rest of the exposed population gets immunity against the virus. That is why the cases are sporadic.

— Mahesh Deshpande | india.com

There is no specific antiviral agent to treat Chandipura virus and there is no vaccine available as of yet. Early diagnosis and treatment are key. A document by the Gujarat government on 'Epidemiology & Management of Chandipura Encephalitis' in 2014, says management of the disease includes managing airways, breathing and circulation through oxygen therapy and ventilation if required.

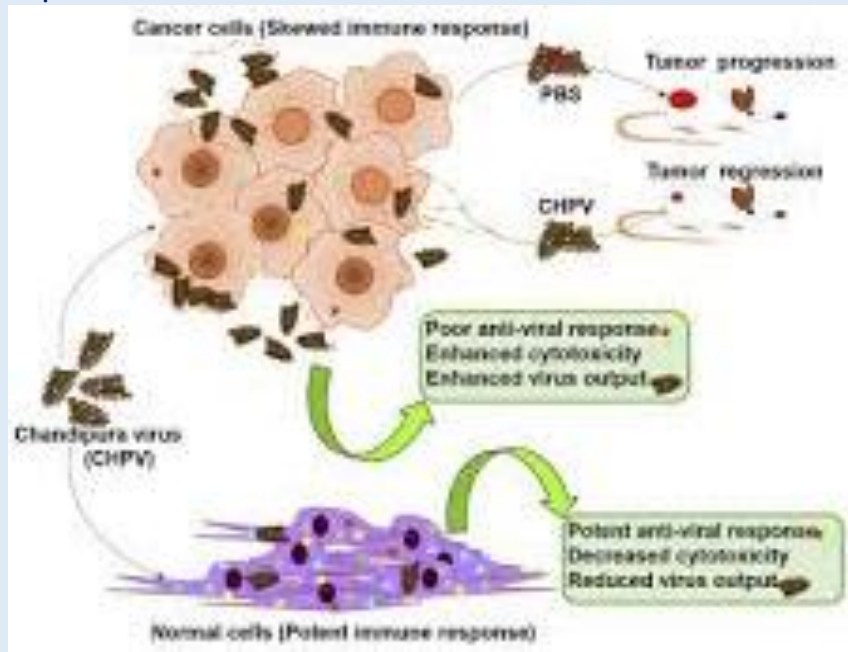
Management of fluid and electrolyte balance, hyperpyrexia (a condition where the body temperature goes above 106.7 degrees Fahrenheit), raised intracranial pressure and seizures and prevention of secondary bacterial infections are also detailed.

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How is it prevented?

Prevention, the document says, includes vector control: identifying sandfly breeding sites, spraying insecticides, sanitation, environmental control, including the proper storage and disposal of waste and refuse, stopping open air defecation, and the use of fly paper. Breeding sites include holes and crevices in walls, holes in trees, dark rooms, stables and storerooms. Prevention of bites is also important, through the use of protective clothing, repellents and nets.



Shockingly, it is feared it also affects cancer cells.

Chandipura virus (CHPV) is an emerging human pathogen of great clinical significance. In this study, it was investigated the susceptibility pattern of both normal and cancer cell lines of human origin to wild-type (wt) CHPV in order to explore the possibility of developing CHPV as an oncolytic vector (OV). All cell lines used in the study except U-138 restricted CHPV infection to

varying degrees with IFN- β pre-treatment and supplementation of interferon (IFN) could neither activate the IFN signalling pathway in U-138 cells. Finally, U-138 tumour xenografts established in non-obese diabetic severe combined immunodeficiency (NOD/SCID) mice showed significant delay in tumour growth in the CHPV-challenged animals. Thus, targeted cytopathic effect in cancer cells at a very low dose with restricted replication in normal cells offers a rationale to exploit CHPV as an oncolytic vector in the future.



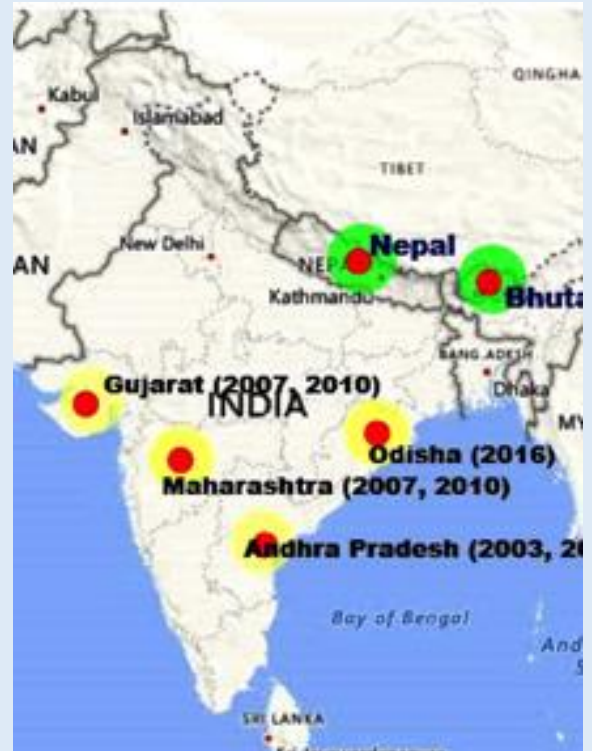
Results show that while cancer cell lines and normal cells of human origin are permissive to CHPV, not all cells are equally susceptible. CHPV was found to be highly cytopathic in human glioblastoma cells, U-138, while normal human adult dermal fibroblast (HADF) cells showed significant resistance.

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The toll in suspected cases of Chandipura Viral Encephalitis (CHPV) rose to 20 in Gujarat on Thursday, including two deaths reported from Ahmedabad city, even as 35 people showing symptoms of CHPV are admitted at various civil hospitals across districts.

While according to an expert from the National Institute of Virology (NIV) in Pune, who did not wish to be identified, only two of the 18 samples sent by the Gujarat government for testing have turned out to be confirmed cases of CHPV, the district health officers have till now reported the deaths of 20 patients with suspected CHPV.



Chandipura virus infection: How to stay safe?

1. Remove standing water sources and clean vegetation surrounding habitations to decrease sandfly breeding grounds.
2. Inform locals about the habits of sandflies and the value of taking preventative action.
3. In case a child exhibits symptoms like vomiting, headache, or elevated temperature, promptly seek medical attention.
4. Pay attention to the treatment and prevention recommendations made by medical specialists.

"In order to prevent Chandipura virus infection, a licensed vaccination is imperative. A vaccine could protect susceptible groups, especially children, and drastically lower the prevalence of this fatal disease if it is developed and made widely available." Says Dr Dubey.



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How common is encephalitis in India?

Since 2005, the overall incidence of acute encephalitis syndrome in India has not decreased, with 10 867–13 672 cases reported each year to the NVBDCP between 2014 and 2017. Directorate of National Vector Borne Disease Control Programme–Delhi state wise number of AES/JE cases and deaths from 2013-2019 (till Nov).



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When is the encephalitis season in India?

It is endemic in 327 districts of 24 states. Seasonal outbreaks: JE cases in India often follow a seasonal pattern, with increased transmission during the monsoon and post-monsoon periods when mosquito populations are higher. Outbreaks typically occur from May to October, peaking during the rainy season.

What is the incidence of Japanese Encephalitis (JE) in India?

JE is a major public health problem among children in medium-endemic Central India. The national estimate of the incidence rate of JE was 1.14 cases during 2007–2011 and 1.08 cases per 1,000,000 population during 2013–2021 based solely on reported secondary public health data.

Who is most at risk for encephalitis?

In general, young children and older adults are at greater risk of most types of viral encephalitis. Similarly, some forms of autoimmune encephalitis are more common in children and young adults, whereas others are more common in older adults. Weakened immune system.

Is encephalitis common in India?

At present, the disease is endemic in as many as 171 districts in 19 States. During 2016, 11,651 case and 1301 deaths were reported to the National Vector Borne Diseases Control Programme (NVBDCP), with a CFR of around 11 per cent⁷. Most deaths were from Uttar Pradesh, followed by West Bengal, Assam and Bihar.

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SYMPTOMS

- ▶ Dizziness
- ▶ Nausea
- ▶ Fever
- ▶ Bodyache
- ▶ Fatigue

TREATMENT

- ▶ Antiviral medication
- ▶ Anti-inflammatory drugs
- ▶ Bed rest
- ▶ Plenty of fluids

PREVENTIVE MEASURES

- ▶ Take preventive vaccination
- ▶ Use repellents
- ▶ Wear long-sleeved clothes
- ▶ Wash hands before and after meals

Source: Media reports, The national medical journal of India, Ministry of health and welfare

Can you live a normal life after encephalitis?

Recovering from encephalitis can be a long, slow and difficult process. Many people will never make a full recovery. Specialised services are available to aid recovery and help the person adapt to any persistent problems – this is known as rehabilitation.

Can you fully recover from viral encephalitis?

Some people eventually make a full recovery from encephalitis, although this can be a long and frustrating process. Many people never make a full recovery and are left with long-term problems caused by damage to their brain. Common complications include: memory loss (amnesia).

Is encephalitis a critical illness?

Encephalitis is inflammation of brain tissue. It is usually caused by an infection. Symptoms might include severe headache, nausea, vomiting, convulsions, personality changes, problems with speech and/or hearing, confusion and disorientation. Encephalitis can range in severity from relatively mild to life threatening.

What is the mortality rate of viral encephalitis?

Even with the advancements in encephalitis diagnosis and treatment, 7–18% of patients still die from the illness

BACKGROUND

- ▶ PROLOGUE: SOME ILLNESS THAT CAN CAUSE NEUROLOGICAL DYSFUNCTION
- ▶ FLU-LIKE PRODRROME

CAUSES

- ▶ VIRAL INFECTION
- ▶ BACTERIAL INFECTION

SYMPTOMS

- ▶ FLU-LIKE PRODRROME
- ▶ TENDS TO AFFECT CHILDREN
- ▶ SEVERE HEADACHE

TREATMENT

- ▶ SUPPORTIVE CARE
- ▶ ANTIVIRAL MEDICATION

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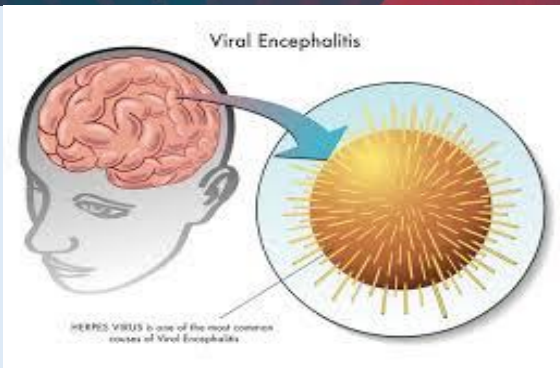
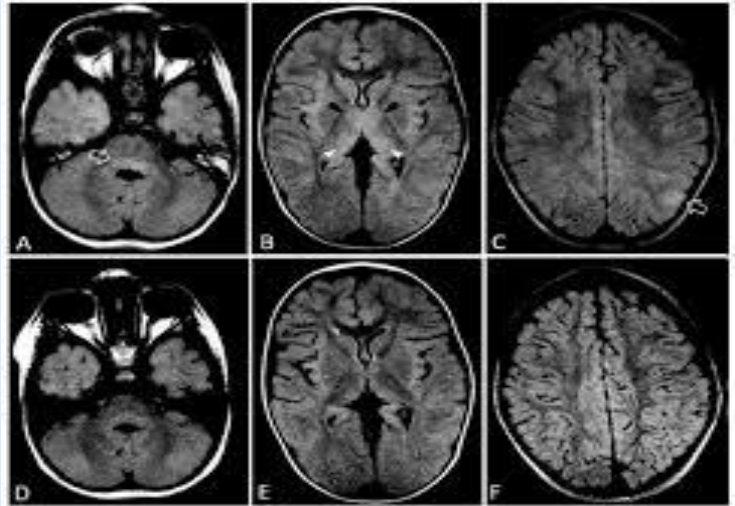
Complications of Encephalitis

- Learning challenges
- Cognitive decline
- Weakness or coordination difficulties
- Vision changes
- Epilepsy
- Hydrocephalus



How long is the treatment for viral encephalitis?

The recommended treatment for CMV encephalitis is a combination of ganciclovir 5 mg/kg IV every 12 hours and foscarnet 60 mg/kg IV every 8 hours or 90 mg/kg IV every 12 hours for 21 days.



Temperature: 100.2 °F (37.8 °C)
Drowsy
GCS 13/15 (M6-V4-E3)

Eyes:
Normal pupillary reaction and size
Normal fundoscopy

Neck stiffness noted
Kernig's and Brudzinkis signs negative
Jolt accentuation test: Negative

CNS: No focal deficits
Heart, Lungs, Abdomen: No abnormalities

What is the best treatment for viral encephalitis?

- Treatment for viral encephalitis:
- hospitalisation.
- antiviral medication,
- given intravenously, if the virus is known to be susceptible to treatment with antiviral medication (such as the herpes simplex virus) intravenous administration of medications to help reduce brain swelling.
- pain-relieving medication.

Medical Management

- VIRAL encephalitis - Acyclovir, Ganciclovir
- Antipyretics to reduce fever
- Diuretics - reduce risk of cerebral edema.
- Anticonvulsants
- Intravenous acyclovir over 10 to 21 days is indicated for herpes simplex virus.
- Mothers who have genital herpes simplex may be treated with acyclovir during the third trimester to avoid shedding the virus to their babies.

What medication is used for encephalitis virus?

Encephalitis caused by certain viruses usually requires antiviral treatment. Antiviral medicines commonly used to treat encephalitis include: Acyclovir (Zovirax, Sitavig). Ganciclovir.

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What antibiotics treat encephalitis?

Antiviral drugs, such as intravenous acyclovir, are often given when encephalitis is initially diagnosed, even before the cause is known. Acyclovir is the best treatment for herpes simplex encephalitis.



Infection and the immune system response

Once viruses have gained access to the bloodstream, they can multiply and spread to other parts of the body, including to the spinal cord and brain (the central nervous system). Access to the brain is by blood or nerves. After breaching the blood–brain barrier, the viruses slip inside brain cells. This disrupts, damages and ultimately ruptures the infected brain cells.

Certain viruses have a preference for different areas of the brain. For example, the herpes simplex virus likes to target the temporal lobes located near each ear.

The cells of the immune system rush to the brain and start attacking the viruses. This causes the characteristic brain swelling (cerebral oedema). Both the infection and the attempts of the body to fight the infection are responsible for the symptoms of viral encephalitis.

Complications of viral encephalitis

Babies, older people and people with reduced immunity are at increased risk of developing complications of viral encephalitis. Some of these complications include:

- low blood pressure (hypotension)
- low oxygen levels in the blood (hypoxaemia)
- bleeding inside the brain (intracerebral haemorrhage)
- permanent brain damage
- death.
- Diagnosis of viral encephalitis

This disease occurs by the sting of a vector-infected sandfly and it mainly affects children aged 9 months–14 years. It is seen more in rural areas.

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Viral encephalitis is diagnosed using a number of tests including:

- physical examination
- blood tests
- laboratory examination of cerebrospinal fluid (clear liquid that bathes the brain and spinal cord) removed via a lumbar puncture (a procedure in which a small needle is inserted into the lower part of the spine)
- computed tomography (CT) scan
- electroencephalography (EEG) to measure brain waves
- magnetic resonance imaging (MRI).

| Infectious encephalitis | Autoimmune encephalitis |
|---|--|
| <ul style="list-style-type: none"> • Flu-like symptoms • Dizziness • Malaise • Headache • Vomiting/gastrointestinal upset • Fever. <p>Later stages indicating a more serious illness involve lowered consciousness which may include:</p> <ul style="list-style-type: none"> • Confusion/drowsiness/seizures/coma. <p>Other symptoms may include:</p> <ul style="list-style-type: none"> • Photo-sensitivity/sensory change/inability to speak or control movement • Uncharacteristic behaviour. | <p>Symptoms will vary depending on the particular autoimmune cause but may include:</p> <ul style="list-style-type: none"> • Confusion • Altered personality or behaviour • Psychosis • Movement disorders • Repetitive, involuntary motor or vocal tics • Seizures • Hallucinations • Memory loss • Sleep disturbance. |

What is the laboratory diagnosis of encephalitis?

Diagnostics tests, which can help to confirm a diagnosis of encephalitis include laboratory tests which analyse cerebrospinal fluid, blood, urine and other body fluids and radiological tests (computed tomography – CT, magnetic resonance imaging – MRI, electroencephalogram – EEG).

Where is encephalitis most commonly found in India?

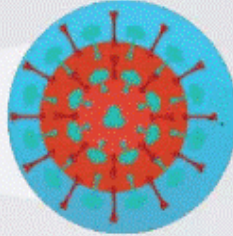
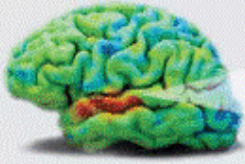
Between 2008 and 2014, there have been more than 44,000 cases and nearly 6000 deaths from encephalitis in India, particularly in Uttar Pradesh and Bihar. In 2016, there has been a rise in encephalitis, with over 125 children reported to have died in one hospital in Gorakhpur alone.

Chandipura virus is a deadly infection that can cause coma and death if not treated on time. Currently, the state of Gujarat is witnessing an increase in the number of cases in children and fatality reports are being recorded too.

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What is Encephalitis?



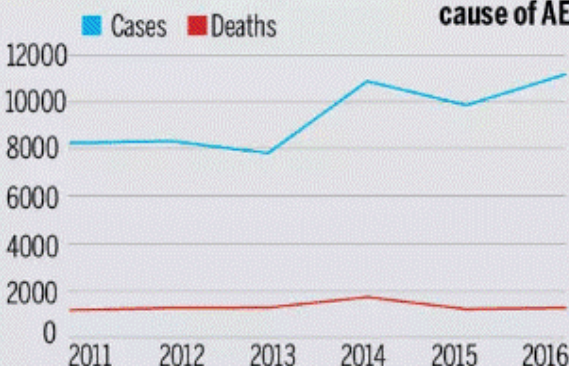
Acute Encephalitis Syndrome (AES) is a disease characterized by high fever, altered consciousness mostly in children below 15 years of age

DISEASE OUTBREAK

At least 108 children have lost their lives in Bihar's Muzaffarpur due to AES since early June

Causative agents of AES include a wide range of viruses, bacteria, fungus, parasites, chemicals & toxins

AES (INCLUDING JE) PREVALENCE



JEV is the most common cause of AES in India



Can encephalitis spread from person to person?

Anyone at any age can get encephalitis. People with weakened immune systems, including people living with HIV or taking immunosuppressant drugs, are at increased risk. Some forms of encephalitis are contagious and can be spread through contact with: Saliva.

How do you diagnose encephalitis?

Tests for encephalitis can include:

Neuroimaging, such as a brain MRI or CT scan.

A lumbar puncture (spinal tap) to check for signs of infection in the brain or spinal cord.

Electroencephalogram (EEG) to look for seizures or specific patterns of electrical activity in the brain.

What happens if encephalitis is not treated?

Encephalitis can damage the brain and cause long-term problems including: memory loss (amnesia) personality and behavioural changes. speech and language problems (aphasia).

Treatment for viral encephalitis

Unlike bacteria, viruses are difficult to treat. Antiviral medications only work on a limited number of viruses. Treatment aims to reduce the severity of the symptoms and may include:

1. hospitalisation
2. antiviral medication, given intravenously, if the virus is known to be susceptible to treatment with antiviral medication (such as the herpes simplex virus)

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3. intravenous administration of medications to help reduce brain swelling
4. pain-relieving medication
5. medication to prevent vomiting
6. medication to prevent seizures (anticonvulsant)
7. medication to reduce fever, such as paracetamol
8. fluids to prevent dehydration, but not too much as this can worsen cerebral oedema (swelling of the brain).

Where to get help

- Always call an ambulance in an emergency.
- Emergency department of your nearest hospital.
- Seek medical help as early as possible.

Acute Encephalitis Syndrome (AES)

In 2018, 10,485 AES cases and 632 deaths were reported from 17 states including Manipur to National Vector Borne Disease Control Programme (NVBDCP).

Signs in children

- Nausea and vomiting
- Bulging of the soft spots (fontanel) in the skull of an infant
- Body stiffness
- Irritability

Causes of Encephalitis

- Common viruses such as HSV (Herpes Simplex Virus) and EBV (Epstein-Barr Virus).
- Viruses causing children illness such as measles and mumps.
- Arboviruses like Japanese Encephalitis Virus, Tick-Borne Encephalitis Virus and West Nile Encephalitis Virus.

Prevention

- Practice good hygiene by washing hands frequently.
- Don't share clothes and food items with the infected person.
- Vaccinate your infants and children on time.
- Prevent mosquito bites by clothing full-body and using mosquito nets.
- Keep your surroundings clean and sanitized.

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PREVENTION AND PRECAUTIONARY MEASURES:

Research shows that symptoms can escalate rapidly, leading to neurological issues and potentially fatal autoimmune encephalitis within the first 24 hours. Historical outbreaks have had high case fatality rates, ranging from 56% to 75%.

The virus is accompanied by the unexpected beginning of flu-like symptoms, including high fever, seizures, diarrhoea, vomiting, convulsions, and altered sensorium. In extreme cases, the viral infection can prompt coma and death. The disease is transmitted primarily through phlebotomine sand-flies and sometimes through ticks and mosquitoes. Monsoon and humidity might be panic. Children's immune systems are less developed than adults', thus they might not be able to fight off the virus as well. Many a times there are misinterpretation of the symptoms as one of the main reasons for the fatal outcome of the infection in kids.

The season of Monsoon might be playing in favour of insects and might be very lethal to the affected person (contaminated child). The Chandipura virus is a rare and dangerous pathogen causing fever, flu-like symptoms, and acute encephalitis (brain inflammation). It is primarily spread through mosquitoes, ticks, and sandflies.

Authorities have deployed 50 teams for extensive dusting operations to control mosquito populations and advised farmers to use insecticides and pesticides. Parents are encouraged to dress their children in full-sleeved clothing to reduce mosquito bites.

There is no specific treatment or vaccine available for the Chandipura virus infection, and hence the management focuses on supportive care and preventive measures.

Personal protection measures, include prevention of bite by protective clothing, repellents and nets. Barefoot walking should be avoided, which also called for sand-fly control measures. An appeal to local farmers to use insecticides and pesticides to kill mosquitos. Kids should be made to wear full-sleeved clothes to protect them from mosquitoes.



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Mosquito bites are a responsible for causing many life-threatening diseases such as malaria, dengue, chikungunya, and Zika, so it becomes imperative to safeguard yourself and others around you.

It is a misconception that mosquitoes only thrive in tropical and warm environments. They can also survive in temperate and colder environments during summer and spring. Although mosquitos are everywhere during the warm monsoon season, they can also be spotted during winter in some regions.

Mosquito bites have been known to cause itchy bumps on the skin, and even become life-threatening with diseases such as malaria, dengue, chikungunya, and Zika. Hence, prevention of mosquito bites is essential.

People should use the right insect repellent and other measures to prevent mosquitoes, ticks and other biting insects from landing on them. Check some preventive measures against the biting of mosquitoes to keep yourself and your family safe.

Management Tips for Chandipura Virus Infection

Early recognition and prompt medical intervention are crucial in managing Chandipura Virus infections. If symptoms suggestive of respiratory illness develop, individuals must seek medical attention immediately. Doctors may recommend supportive care, including rest, [hydration](#), and symptomatic treatment to alleviate fever and respiratory symptoms.

As we navigate the complexities of the Chandipura Virus, efforts to understand its epidemiology, transmission dynamics, and potential for spread are ongoing, underscoring the collaborative efforts needed across scientific disciplines and international borders. By staying informed and adopting preventive measures, we can collectively mitigate the impact of emerging infectious diseases like the Chandipura Virus, safeguarding both individual and community health.

How to Keep Children Safe from Chandipura Virus?

One cannot guarantee a safety net from getting infected from any virus, but what we can do is maintain a healthy and clean surrounding and lower the risk of getting infected as much as possible.

- 1. Clean Surrounding:** Chandipura virus is mostly infected from sand flies that breed over garbage, little and dirty areas. Therefore, it is imperative to keep your surrounding clean. Avoid stagnation of water. Keep kids away from dustbins in public spaces.
- 2. Full Sleeves Clothing:** This is another important step that is often overlooked and understated. It is important to wear light clothes that completely keeps the body covered. It will help to reduce the risk of getting bitten or infected by sand flies or mosquitoes, especially when the virus is spreading like wildfire.

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- 3. Insect Repellants:** Insecticide sprays can help eliminate the vector, said the experts, while also calling for efforts to prevent the spread of the virus by controlling sandfly populations.
- 4. Bed Nets:** Another health strategy is used insect repellants and bed nets while sleeping.
- 5. Healthy Lifestyle:** A nutrient-dense diet that helps to boost immunity is also essential to combat pathogens.

Cases have been reported from Sabarkantha, Aravalli, Mahisagar, Kheda, Mehsana and Rajkot districts, Mortality rate in the disease is high and it is difficult for a patient to survive if there is a delay in getting treatment.



Remove Mosquito Habitats

- Remove standstill water in rain gutters, old tyres, buckets, toys, plastic covers, or another container where mosquitoes breed.
- Empty and change the water bird baths, fountains, wading pools, rain barrels, and potted plant trays at least once a week to kill potential mosquito habitats.
- Drain or fill the temporary pools of water with dirt.
- Keep the water pools treated and circulating.

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Use Appropriate Pesticides

- Use proper techniques to control the mosquito larvae in the habitat.
- Control adult mosquitoes using insecticides.

Use Structural Barriers

- Prevent entrance for mosquitoes by filling the gaps in walls, doors, and windows preventing them from entering.
- Ensure that window and door screens are in working condition.
- Cover baby carriers and beds with mosquito nets properly.

Avoid Getting Bitten

- Wear long-sleeved shirts, long pants and socks to keep mosquitoes away from exposed skin.
- Prevent mosquitoes from entering inside your clothes, tuck your shirts into pants, and pants into socks leaving no gaps for mosquitoes to bite.
- Stay indoors as much as possible, especially when mosquito-borne diseases are in effect.
- Use EPA-registered mosquito repellents when necessary and follow label directions and precautions closely.
- Use head nets, long sleeves and long pants if you venture into areas with high mosquito populations, such as marshes.
- Replace your outdoor lights with yellow 'bug' lights, which tend to attract fewer mosquitoes than ordinary lights.

