

New Curse of West Bengal?

Sanjana Nayak

After COVID-19, another highly infectious disease, Adenovirus, is wreaking havoc in West Bengal, a state in India. It has registered a total of 12,000 cases of Adenovirus from January 2023 to March, according to the reports this is a highly contagious disease that now threaten vulnerable especially in children. The current surge in cases of this respiratory wrecking disease is bringing back fears of what people faced back in 2021 when the second wave of COVID-19 was at its peak. The adenoviruses are DNA viruses common in animals and humans, frequently occurring in both adults and children. There are more than 100 serologically different types of adenovirus, with 49 types that infect humans. The family Adenoviridae is separated into two genera: the avian adenoviruses (aviadenoviruses) and the mammalian adenoviruses (mast adenovirus). Adenovirus is ubiquitous in animals, and in human populations, they may last long periods outside of a host, endemic throughout the year. Based on various serotypes, adenovirus is known as the etiologic mediator of multiple syndromes. It is spread via aerosolized droplets, direct inoculation to the conjunctiva, exposure to infected tissue, blood, and fecal-oral route.

What Isthis Adenoviruse? Adenoviruses (members of the family Adenoviridae) are medium-sized (90-100 nm), no enveloped (without an outer lipid bilayer) viruses with icosahedral nucleocapsid containing a double-stranded DNA genome. 240 hexon proteins make up the bulk of the capsid, while twelve penton bases cap the icosahedron's corners. The penton bases are associated with protruding fibers that aid in attachment to the host cell via the receptor on its surface. The virus is composed of around 1 million amino acid residues and weighs around 150 MDa. Their name derives from their initial isolation from human adenoids in 1953. They have a broad range of vertebrate hosts; in humans, more than 50 distinct adenoviral serotypes have been found to cause a wide range of illnesses, from mild respiratory infections in young children (known as the common cold) to life-threatening multi-organ disease in people with a weakened immune system. In general, adenovirus infections are self-limited in immunocompetent individuals requiring supportive measures only. However, in immunocompromised individuals, the spectrum of disease is much more extensive, with outcomes potentially being fatal.

When Do Adenoviruse Infections Occur And Who Are More At Risk For Infection? Adenovirus infections can occur in any season but they tend to peak in the winter and early spring. Most adenovirus infections occur among young children (under 5 years of age). Adults who are in closed or crowded environments, such as in dormitories, military quarters, nursing homes, or hospitals are also at higher risk.

Does It Have Any Other Variations And Do They Have Any Symptoms? More than 100 antigenic types of adenoviruses have been identified that infect mammals (mast adenoviruses) and birds (aviadenoviruses); 47 human adenovirus types are classified, 5 more candidate types are presently studied.

This family contains the following genera:

- At adenovirus
- Aviv adenovirus
- Ichtadenovirus
- Mast adenovirus (including all human adenoviruses)
- Siadenovirus
- Test adenovirus

In humans, currently there are 88 human adenoviruses (HAdVs) in seven species (Human adenovirus A to G):

- A: 12, 18, 31
- B: 3, 7, 11, 14, 16, 21, 34, 35, 50, 55
- C: 1, 2, 5, 6, 57
- D: 8, 9, 10, 13, 15, 17, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 36, 37, 38, 39, 42, 43, 44, 45, 46, 47, 48, 49, 51, 53, 54, 56, 58, 59, 60, 62, 63, 64, 65, 67, 69, 70, 71, 72, 73, 74, 75
- E: 4
- F: 40, 41
- G: 52

Different types/serotypes are associated with different conditions:

- respiratory disease (mainly species HAdV-B and C)

- conjunctivitis (HAdV-B and D)
- gastroenteritis (HAdV-F types 40, 41, HAdV-G type 52)
- obesity or adipogenesis (HAdV-A type 31, HAdV-C type 5, HAdV-D types 9, 36, 37)

All these types are called Human mast adenovirus A–G by the ICTV, because all are members of the genus Mast adenovirus. Common problems and symptoms vary and may include any of the following:

- Respiratory (cough, fever, fast breathing,

wheezing, sore throat)

- Common cold (upper respiratory infection)
- Bronchitis
- Pneumonia
- Gastrointestinal (GI)
- Diarrhea
- Hepatitis (liver)

Rare problems:

- Conjunctivitis (pink eye)
- Encephalitis (brain) – rare
- Myocarditis (heart) – rare

Most adenoviral infections are mild and go away without treatment. People with weakened immune systems are at higher risk of developing severe symptoms. Rarely, a person can have a severe illness that can result in respiratory and liver failure and death.

What Are The Threats To Us? As per my research, you can get infected with an adenovirus in different ways including:

- A Close exposure to another person who has the virus a Contact with a person’s hands that have touched infected eyes (conjunctiva) or nose or cough mucus
- Touching a surface or object that is contaminated with the virus.
- This virus can survive up to 30 days on surfaces a Breathing in virus from the air of a person who coughs or sneezes a Contact with stool from a person with diarrhea
- A Swimming in non-chlorinated water that contains the virus.

Adenoviruses cause acute respiratory disease (usually), pneumonia (occasionally), acute follicular conjunctivitis, epidemic keratoconjunctivitis, cystitis, and gastroenteritis (occasionally). In infants, pharyngitis and pharyngeal-conjunctival fever are common. Adenoviruses are unusually stable to chemical or physical agents and adverse pH conditions, allowing for prolonged survival outside of the body and water. Adenoviruses are spread primarily via respiratory droplets; however, they can also be spread by faecal routes and via aerosols (airborne transmission). Research into the molecular mechanisms underlying adenoviral transmission provide empirical evidence in support of the hypothesis that coxsackievirus/adenovirus receptors (CARs) are needed to transport adenoviruses into certain naive/progenitor cell types. Humans infected with adenoviruses display a wide range of responses, from no symptoms at all to the severe infections typical of Adenovirus serotype 14. The virus infects multiple organ systems; though, most infections are asymptomatic. Adenovirus is recognized to be oncogenic in rodents, but that has not yet been observed in humans.

Are There Any Vaccines Against Adenoviruses? Currently there is a vaccine for adenovirus type 4 and 7 for US military personnel only. US military personnel are the recipients of this vaccine because they may be at a higher risk of infection. The vaccine contains a live virus, which may be shed in stool and lead to transmission. The vaccine is not approved for use outside of the military, as it has not been tested in studied in the general population or on people with weakened immune systems.

How Adenoviruses Can Be Prevented? Prevention of adenovirus, as well as other respiratory illnesses, involves frequent hand washing for more than 20 seconds, avoiding touching the eyes, face, and nose with unwashed hands, and avoiding close contact with people with symptomatic adenovirus infection. Those with symptomatic adenovirus infection are additionally advised to cough or sneeze into the arm or elbow instead of the hand, to avoid sharing cups and eating utensils, and to refrain from kissing others. Chlorination of swimming pools can prevent outbreaks of conjunctivitis caused by adenovirus. r. Virus shedding (released from the body) can continue for days to weeks even after the person recovers from the acute illness, therefore those who were infected can still spread to others even when they appear well. Disinfection of fomites [fo-mites] (clothes, utensils and furniture) is difficult as the virus is resistant to many disinfectants. Clean surfaces with heat or bleach containing products.

How Are Adenovirus Infections Diagnosed And Treated? In the laboratory, adenovirus can be identified with antigen detection, polymerase chain reaction (PCR), virus isolation and serology. Adenovirus can be isolated by growing it in cell cultures in a laboratory, which takes several days. These tests use molecular based PCR and antigen detection to identify small amounts of viral DNA or protein. In severe cases, the virus can be detected in the blood. Tests are only necessary in very serious cases. Tests include blood tests, eyes, nose or throat swabs, stool sample tests, and chest x-rays. As per my research, there are no proven antiviral drugs to treat adenoviral infections, so treatment is largely directed at the symptoms (such as acetaminophen for fever). The antiviral drug cidofovir has helped certain of those patients who had severe cases of illness; the number helped and to what degree, and the complications or symptoms it helped with, and when and where this happened, were not given in the source. A doctor may give antibiotic eye drops for conjunctivitis, while awaiting results of bacterial cultures, and to help prevent secondary bacterial infections. Currently, there is no adenovirus vaccine available to the public, but a vaccine is available for the United States military for Types 4 and 7.

Recent Threat To Our State: It is a combination of two adenovirus strains that is spreading fast and laying children low, even causing deaths, tests have confirmed. A serotyping done on adenovirus samples at ICMR-NICED Kolkata has found a combination of the dangerous strain 7, along with the virulent strain 3, in a majority of samples. A virus outbreak has put children's lives in peril in West Bengal. Adding further panic over the adenovirus spread in West Bengal, the mortality rate of the children is increasing day by day. Though the state Health Department has stopped issuing any bulletin on virus-related deaths, there are claims of 48 deaths during the last 11 days. Officials put mortality figures at 19, unofficial estimates suggest the number of children who have died to be well over 100 between December 2022 and the first week of March, 2023. A National Institute of Cholera and Enteric Diseases official said around 32% of the samples sent to them since January tested positive for adenovirus. "In December, it was 22%. Usually, it ranges below 10%". The state registered 12,343 cases of acute respiratory infections since January.

As per my research there are no antiviral drugs, medicines or any specific treatment for this adenovirus infection. Most adenovirus infections are mild and may be managed with rest and over-the-counter pain or fever reducers to help relieve symptoms. I believe that to avoid getting infected includes avoiding touching your eyes, nose or mouth with contaminated hands and to regularly use soap or sanitiser to wash your hands frequently. It has been noticed that our body's immune system fights the infection and it resolves in three to five days in most individuals. Bed rest and isolation prevents spread of the infection. As we all know "PREVENTION IS BETTER THAN CURE" hence preventive measures should be followed to lower the risk of contamination as well as the infection. Prevention of adenovirus, as well as other respiratory illnesses, involves frequent hand washing for more than 20 seconds, avoiding touching the eyes, face, and nose with unwashed hands, and avoiding close contact with people with symptomatic adenovirus infection. Those with symptomatic adenovirus infection are additionally advised to cough or sneeze into the arm or elbow instead of the hand, to avoid sharing cups and eating utensils, and to refrain from kissing others. Chlorination of swimming pools can prevent outbreaks of conjunctivitis caused by adenovirus. These preventive measures should be followed to lead a healthy life free of adenovirus or any other virus responsible for respiratory illnesses.