

- **Delhi Health Minister Satyendar Jain** said the city has recorded **1,044 cases of mucormycosis or "black fungus"**.
- He added that 89 people have died so far due to the fungal infection, which has been reported among hundreds of recovered Covid-19 patients.



Key Points

Mucormycosis or black fungus infection cases continue to rage
across states in India. Reports suggest that caseloads have
risen up by a whopping 32% in the recent week. The most cases seem to be traced amongst those who
have recently battled COVID-19 due to their frail immunity.

Reason for Recent Outbreak

- **Doctors believe mucormycosis**, which has an overall mortality rate of 50%, may be being triggered by the use of steroids, a life-saving treatment for severe and critically ill Covid-19 patients.
- Steroids reduce inflammation in the lungs for Covid-19 and appear to help stop some of the damage that can happen when the body's immune system goes into overdrive to fight off coronavirus.
- But they also reduce immunity and push up blood sugar levels in both diabetics and non-diabetic Covid-19 patients. It's thought that this drop in immunity could be triggering these cases of mucormycosis.
- High, severe diabetes also **suppresses immunity and makes one susceptible to other inflammatory conditions.**

What Is Black Fungus?

- Mucormycosis (sometimes called zygomycosis) is a serious but rare fungal infection caused by a group
 of molds called mucormycetes.
- These fungi live throughout the environment, particularly in soil and in decaying organic matter, such as leaves, compost piles, or rotten wood.
- People get mucormycosis by coming in contact with the fungal spores in the environment.
- For example, the lung or sinus forms of the infection can occur after someone breathes in spores.
- These **forms of mucormycosis** usually occur in people who have health problems or take medicines that lower the body's ability to fight germs and sickness.
- **Mucormycosis** can also develop on the skin after the fungus enters the skin through a **cut**, **scrape**, **burn**, **or other type of skin trauma**. **Mucormycosis** is particularly dangerous because it spreads quickly throughout the body. **Left untreated**, **the infection can spread to the lungs or the brain**.
- This can cause: a brain infection, paralysis, pneumonia, seizures and death

Types of Mucormycosis

- **Rhinocerebral (sinus and brain) mucormycosis** is an infection in the sinuses that can spread to the brain. This form of mucormycosis is most common in people with uncontrolled diabetes and in people who have had a kidney transplant.
- **Pulmonary (lung) mucormycosis** is the most common type of mucormycosis in people with cancer and in people who have had an organ transplant or a stem cell transplant.
- **Gastrointestinal mucormycosis** is more common among young children than adults, especially premature and low birth weight infants less than 1 month of age, who have had antibiotics, surgery, or medications that lower the body's ability to fight germs and sickness.
- **Cutaneous (skin) mucormycosis** occurs after the fungi enter the body through a break in the skin (for example, after surgery, a burn, or other type of skin trauma). This is the most common form of mucormycosis among people who do not have weakened immune systems.
- **Disseminated mucormycosis** occurs when the infection spreads through the bloodstream to affect another part of the body. The infection most commonly affects the brain, but also can affect other organs such as the spleen, heart, and skin.

What Are Symptoms Of Black Fungus?

- The **symptoms of mucormycosis** depend on where in the body the fungus is growing.
- Symptoms of rhinocerebral (sinus and brain) mucormycosis include:
- One-sided facial swelling, Headache
- Nasal or sinus congestion
- Black lesions on nasal bridge or upper inside of mouth that quickly become more severe, Fever

Symptoms of pulmonary (lung) mucormycosis include:

Fever

Chest pain

Cough

- Shortness of breath
- Cutaneous (skin) mucormycosis can look like blisters or ulcers, and the infected area may turn black. Other symptoms include pain, warmth, excessive redness, or swelling around a wound.

Symptoms of gastrointestinal mucormycosis include:

- Abdominal pain
- Nausea and vomiting
- Gastrointestinal bleeding
- **Disseminated mucormycosis** typically occurs in people who are already sick from other medical conditions, so it can be difficult to know which symptoms are related to mucormycosis. Patients with disseminated infection in the brain can develop mental status changes or coma Spread OfMucormycosis

- People can get black fungus on coming in contact with the spores from the environment. In case of the lung or sinus infection the person can be infected after inhaling the spores from the air. A skin infection can occur after the fungus enters the skin through a scrape, burn, or other type of skin injury.
- Black fungus disease is not contagious, which means that it cannot spread from contact between humans or animals
- These fungi are not harmful to most people but for people who have weakened immune systems, breathing in micromycetes spores can cause an infection.

What Is White Fungus Or Aspergillosis?

- White fungus is deadlier than black fungus, say experts.
- It spreads to several parts of your body and severely damages your lungs. Severe effects can be seen on the kidney, mouth, skin and brain.
- The white fungus begins from the tongue or private parts, it makes the tongue white, and then it spreads to other parts like lungs, brain and food pipes.



What Are The Causes Of White Fungus Infection?

- Low immunity
- Contact with infectious moulds
- Poor hygiene
- Symptoms of White Fungus
- Cough
- Fever

- Diarrhoea
- Dark spots on lungs
- Reduced oxygen level
- White patches in oral cavity
- Skin lesions

How Can You Protect Yourself From White Fungus?

- People with low immunity are more prone to these fungal diseases, so it is necessary to maintain a healthy immune system.
- Maintain your surroundings clean and free from dust.

What Is Yellow Fungus?

- Unlike black and white, yellow fungus starts internally, causes pus leakage, and leads to slow healing of wounds. In some serious cases, it could further lead to devastating symptoms like organ failure and acute necrosis (cell injury).
- First case of yellow fungus was reported in Uttar Pradesh's Ghaziabad. Experts say yellow fungus can be scarier than black and white because of the manner it affects the body's internal organs.

Symptoms of Yellow Fungus

- Lethargy
- Poor appetite or no appetite

- Weight loss or poor metabolism
- Sunken eyes

How Can You Protect Yourself From Yellow Fungus?

- Fungal infections generally spread through bad hygiene, so it is important to have good hygiene habits.
- Keep your surroundings clean.
- Remove stale food from the house to prevent the growth of fungus or bacteria.
- Humidity also plays an important role, so keep your humidity level between 30% to 40%.

What Are The Causes Of Yellow Fungus Infection?

- Poor hygiene
- Moisture and heat
- Contaminated food

- Overuse of steroids
- States on Black Fungus
- **Rajasthan:** Rajasthan was the first state to declare mucormycosis an epidemic in the state under the Rajasthan Epidemic Act 2020, About 700 cases of black fungus infection have been reported among the cured Covid- 19 patients in Rajasthan
- **Telangana:** After Rajasthan, Telangana declared mucormycosis a notifiable disease under the Epidemic Diseases Act, 1897. Around 90 cases of mucormycosishave been detected in the state so far.
- **Karnataka**: Karnataka health minister K Sudhakar announced mucormycosis an epidemic on May 20, 2021. While making the statement he also said that no hospital with the capacity to treat the infection can deny patients.
- **Tamil Nadu:** Tamil Nadu declared mucormycosis a notifiable disease under Tamil Nadu Public Health Act, 1939. A 10-member committee, including the Director, Medical Education with medical experts had also been constituted to monitor the situation.
- **Odisha**: Paying heed to the Centre's advisory Odisha's Health and Welfare Department declared 'black fungus' a notifiable disease under the Epidemic Diseases Act, 1897, on Thursday.

- **Gujarat: Gujarat Chief Minister Vijay Rupani** declared mucormycosis an epidemic under the Epidemic Diseases Act, 1897, in May 2021. Gujarat currently has 2,281 mucormycosis patients the highest recorded in any state in the country so far, according to data from the central government.
- **Punjab:** The Punjab government declared it a notified disease under the Epidemic Diseases Act 1897.
- Haryana: The state of Haryana also declared black fungus as a notifiable disease. "Black Fungus declared Notified Disease in Haryana. Now, doctors will report to CMOs of the district of any Black Fungus case detected," Haryana Health Minister Anil Vij said in a tweet.
- **Bihar**: After having reported over 117 cases of mucormycosis in the state, Chief Minister NitishKumar on declared Black fungus as an epidemic disease under Section 2 of the Epidemic Disease Act 1897.
- **Uttarakhand:** The Uttarakhand government declared black fungus as a notified disease in the state under the Epidemic Diseases Act, 1897. The state government has also issued an SOP for distribution of Amphotericin B, a drug used in treating black fungus patients.
- Madhya Pradesh: The Madhya Pradesh government declared black fungus a notified disease in the state under the provisions of the Epidemic Diseases Act and the Madhya Pradesh Public Health Act.
- Maharashtra: Maharashtra is the latest state to classify black fungus as a notified disease.
- **Andhra Pradesh**: The Andhra Pradesh government has notified mucormycosis under the Epidemic Diseases Act, 1897.
- **Delhi:** The Delhi government declared mucormycosis, commonly known as black fungus, a notified disease under the Epidemic Diseases Act, 1897.

Notifiable Disease

- Any failure to report a notifiable disease is a criminal offence and the state government can take necessary actions against defaulters.
- The onus of notifying any disease and the implementation lies with the state government. The Centre has notified several diseases such as **cholera**, **diphtheria**, **encephalitis**, **leprosy**, **meningitis**, **pertussis** (whooping cough), plague, tuberculosis, AIDS, hepatitis, measles, yellow fever, malaria dengue, etc.
- In less infectious conditions, it improves information about the burden and distribution of disease.
- The process helps the government keep track and formulate a plan for elimination and control. This means every government hospital, private hospital, laboratories, and clinics will have to report cases of the disease to the government.
- Registered medical practitioners need to notify such diseases in a proper form within three days, or notify verbally via phone within 24 hours depending on the urgency of the situation.
- Making a disease legally notifiable by doctors and health professionals allows for intervention to control the spread of highly infectious diseases.
- The collation of information allows the authorities to monitor the disease, and provides early warning of possible outbreaks.
- A notifiable disease is any disease that is required by law to be reported to governmentauthorities.

Editorial

- The number of black fungus cases crossed the 200 mark in Chandigarh on Wednesday. According to health authorities, eight patients, including three from the city, have succumbed to the fungal infection at local hospitals. Mucormycosis, or black fungus, is a rare but serious type of fungal infection that requires medication or removal surgery. It is being reported among people who have recovered from Covid-19, as the virus potentially weakens the body's immune response. The rate is much higher among those with diabetes or those who have taken steroids during Covid-19 treatment.
- As on Wednesday, there are 201 patients, including 147 at the Post Graduate Institute of Medical Education and Research (PGIMER). While 50 patients are being treated at Government Medical College and Hospital, Sector 32, three are admitted to Healing Hospital and one to Mukat Hospital. Among these patients, 25 are from Chandigarh and the remaining 176 from other states. "Even before the pandemic, rates of mucormycosis in India were about 70 times higher when compared to the rest of the world," said Dr ArunalokeChakrabarti, head, medical microbiology, PGIMER. Dr Chakrabarti said a drop in new cases will be seen with consciousness about glycemic (sugar) control and reducing the use of steroids. "Covid imbalances your immunity. We have seen that up to 42 days post Covid infection, people can acquire mucormycosis. People who have recovered, especially those with diabetes, should wear masks at least for a month, even at home," he said.
- Source: Hindustan times

COVID-19 DELTA VARIANT

• India said it has found around 40 cases of the Delta coronavirus variant carrying a mutation that appears to make it more transmissible and advised states to increase testing.

What Is Delta Variant?

- First identified in India, Delta is one of several "variants of concern," as designated by the Centers for Disease Control and Prevention and the World Health Organization.
- It has spread rapidly through India and Britain.
- The super-contagious Delta variant of the coronavirus is responsible for about 1 in 5 COVID-19 cases in the United States
- Delta, formerly known as B.1.617.2, is believed to be the most transmissible variant yet, spreading more easily than both the original strain of the virus and the Alpha variant first identified in Britain.
- The Delta variant has certain significant mutations in the spike protein of the virus—the pointy elements that give it the shape of a crown.
- These spikes are like hooks that have to find the receptors in a human cell to link with. Studies have shown that these spikes hook onto receptors called ACE-2.
- Once these spike proteins can unlock the cells, the infection spreads by replicating the genetic code of the virus. Some key mutations in the **Delta variant—such as the E484Q, L452R, and P614R—make it easier for the spikes in the virus to attach to ACE-2 receptors.**

- This means it can infect and replicate faster, and even evade the body's natural disease-fighting immunity more efficiently.
- The **spike protein mutations make the Delta variant the "fastest and fittest**" variant yet, according to the WHO
- Other evidence suggests that the variant may partially evade the antibodies made by the body after a coronavirus infection or vaccination. And the variant may render certain monoclonal antibody treatments less effective
- Delta may also cause more severe illness. A recent Scottish study, for instance, found that people infected by the Delta variant were roughly twice as likely to be hospitalized than those infected with Alpha Spread
- Delta has been reported in 80 countries. It is now the most common variant in **India and Britain, where** it accounts for more than 90% of cases.
- In the US, too, the number of Delta variant cases is rapidly rising, up from 10% of the total Covid-19 cases to 20%.
- The delta variant accounts for more than a third of new cases each day in the US. If a person infected with the original strain could infect nearly two people, a person with the Alpha variant could infect four people.
- With Delta, one person could infect nearly seven other people. It's important to remember that these are averages, not absolute numbers; one Delta carrier might infect zero people, or 25.

What Is Delta Plus?

- The Delta variant has developed a new mutation of a type that was first found in the Beta variant.
- The **new variant—which is being labeled Delta Plus**, additionally has the K417N mutation in its spike protein, which is associated with increased immunity escape. This variant could also potentially lead to vaccines being less effective.
- Experts believe Delta Plus has increased transmissibility but it is still not very clear as to how virulent this new strain is in comparison to other variants. The Delta Plus variant has now been detected in eleven countries, including the UK, US, China, and Japan. Till now, the World Health Organization (WHO) has not classified it as a "variant of concern" and scientists believe there is not enough evidence to support the claims of this variant being a 'concern'.
- However, the Indian government is treating this mutant as a variant of concern as a preventive step against another possible outburst of cases in the country.

How Do Variants Of A Virus Emerge?

- Variants of a virus have one or more mutations that differentiate it from the other variants that are in circulation.
- Essentially, the goal of the virus is to reach a stage where it can cohabitate with humans because it needs a host to survive.
- **Errors in the viral RNA are called mutations**, and viruses with these mutations are called variants. Variants could differ by a single or many mutations.

What Causes A Virus To Change To A New Variant?

- When a virus is widely circulating in a population and causing many infections, the likelihood of the virus mutating increases.
- The more opportunities a virus has to spread, the more it replicates and the more opportunities it has to undergo changes.
- Most viral mutations have little to no impact on the virus's ability to cause infections and disease.
- But depending on where the changes are located in the virus's genetic material, they may affect a virus's properties, such as transmission (for example, it may spread more or less easily) or severity (for example, it may cause more or less severe disease).

What Is A Mutation?

- A mutation means a change in the genetic sequence of the virus. In the case of SARS-CoV-2, which is a
 Ribonucleic acid (RNA) virus, a mutation means a change in the sequence in which its molecules are
 arranged.
- A mutation in an RNA virus often happens when the virus makes a mistake while it is making copies of itself.
- What Impact Do The New Variants Of The COVID-19 Virus Have On Vaccines?
- The COVID-19 vaccines that are currently in development or have been approved are expected to provide at least some protection against new virus variants because these vaccines elicit a broad immune response involving a range of antibodies and cells.
- Therefore, changes or mutations in the virus should not make vaccines completely ineffective. In the event that any of these vaccines prove to be less effective against one or more variants, it will be possible to change the composition of the vaccines to protect against these variants.
- Manufacturers and the programmes using the vaccines may have to adjust to the evolution of the COVID-19 virus: for example, vaccines may need to incorporate more than one strain when in development, booster shots may be required, and other vaccine changes may be needed.
- Trials must also be designed and maintained to allow any changes in efficacy to be assessed and must be of sufficient scale and diversity to enable clear interpretation of results.

Variants of Concern

- A SARS-CoV-2 variant that meets the definition of a VOI and, through a comparative assessment, has been demonstrated to be associated with one or more of the following changes at a degree of global public health significance:
- Increase in transmissibility or detrimental change in COVID-19 epidemiology; or Increase in virulence or change in clinical disease presentation; or
- Decrease in effectiveness of public health and social measures or available diagnostics, vaccines, therapeutics.

Variants of Interest

- A SARS-CoV-2 isolate is a Variant of Interest (VOI) if, compared to a reference isolate, its genome has mutations with established or suspected phenotypic implications, and either:
- has been identified to cause community transmission/multiple COVID-19 cases/clusters, or has been detected in multiple countries; OR is otherwise assessed to be a VOI by WHO in consultation with the WHO SARS-CoV-2 Virus Evolution Working Group.

Editorial

- The Centre has asked the state governments where cases of Delta Plus variant of coronavirus have surfaced, to redouble containment and testing efforts, and carry out surge vaccinations.
- The **Union health ministry** said on Wednesday that there are 40 confirmed infections with the Delta Plus variant, up from 22 a day before. "The Public Health Response, in this case, while broadly remaining the same, has to become more focused and stringent. Thus, you are requested to take up immediate containment measures in these districts and clusters including preventing crowds and intermingling of people, widespread testing, prompt tracing as well as vaccine coverage on a priority basis," Union health secretary Rajesh Bhushan said in a letter sent to state chief secretaries.
- Delta Plus has already been declared a variant of concern by the central government. The cases have primarily ben concentrated in three states Maharashtra, Madhya Pradesh and Kerala.
- In Kerala, three villages have been shut and residents are being mandatorily tested for Covid- 19, while in Maharashtra, health minister Rajesh Tope said that 100 samples from each district will immediately be sent for genome sequencing. Maharashtra saw a jump in its daily Covid-19 count on Wednesday, recording 10,066 fresh cases. Tope saidit is a matter of concern that daily cases are not falling below 8,000.
- Jammu and Kashmir and Karnataka's capital Bengaluru recorded their first case of Delta Plus variant on Wednesday. In J&K, the patient is a 39-year-old employee of Shri Mata Vaishno Devi Shrine Board. She has been kept in isolation at home with mild symptoms. Karnataka health minister Dr K Sudhakar said the state government has informed the Union health ministry about the Bengaluru case and further action is being planned. Till now, the Delta Plus variant has been found in 197 samples across 11 countries Britain, India, Canada, Japan, Nepal, Poland, Portugal, Russia, Switzerland, Turkey, and the United States. No deaths have reported among the UK and Indian cases. The Indian Council of Medical Research (ICMR) and the National Institute of Virology (NIV) have decided to conduct a study to see if the new and more potent variant of coronavirus can be neutralised by the existing vaccines in India.
- The study is likely to involve **Covaxin and Covishield vaccines**. "As per earlier data concerning Delta variant, neutralisation was happening with the existing vaccines in India. Though neutralisation has dropped, it's enough to protect against Delta variant. Delta Plus should also behave (in a similar manner). We are working in this direction. We have isolated this variant and we are going to conduct a study soon. We will come back with the study," she said. All Delta sub-lineages are treated as variants of concern (VOC) and properties of AY.1 are still being investigated. Delta Plus is also known as 'AY.1' variant or B.1.617.2.1.

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