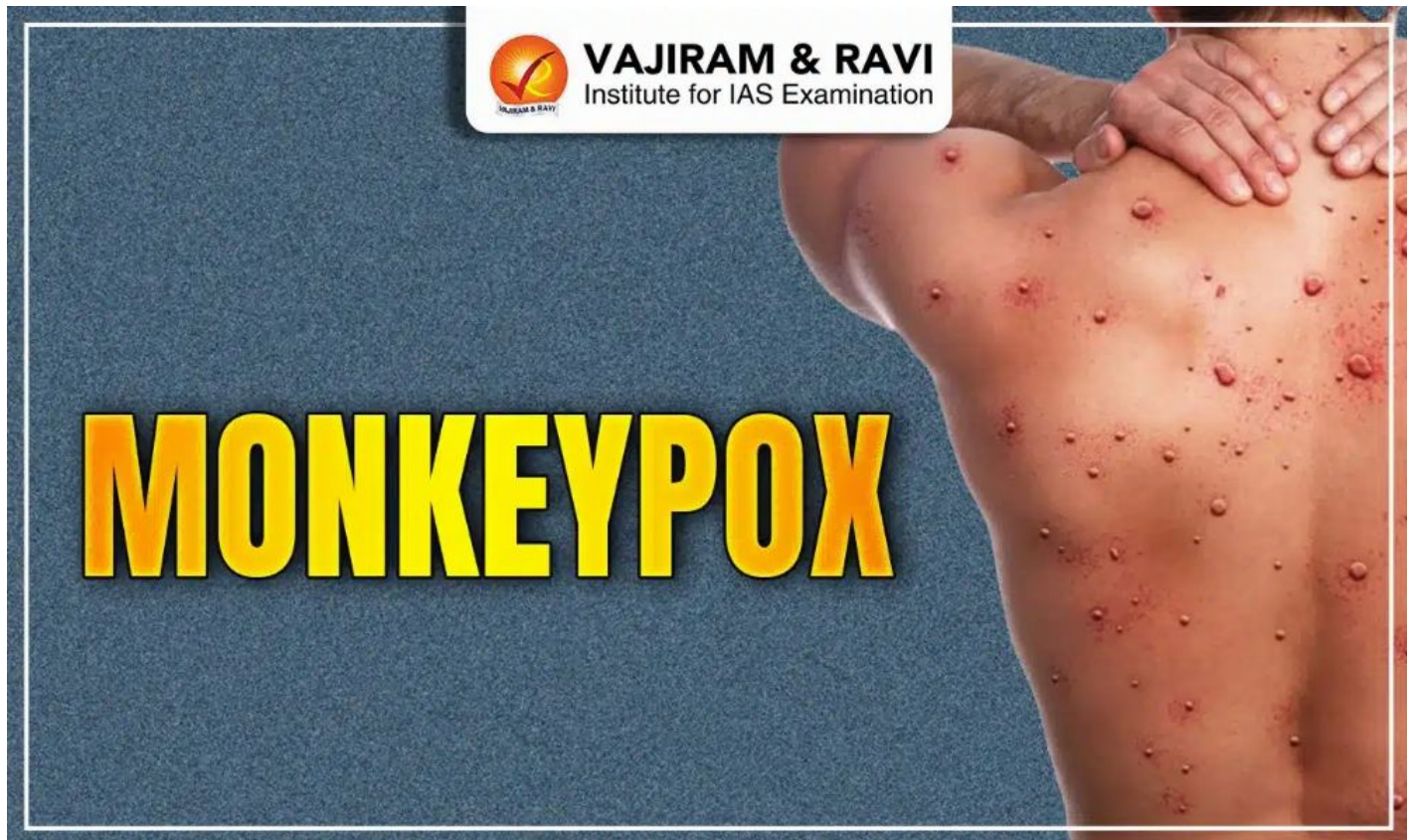


Monkeypox (Mpox): Virus Disease Outbreak

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Monkeypox, later renamed 'Mpox' by WHO, is a rare **zoonotic viral disease** caused by infection with the **Mpox virus**. The monkeypox virus belongs to the same family of viruses as the **variola virus**, the virus that causes **smallpox**.

Mpox symptoms are similar to smallpox symptoms but milder, and Mpox is rarely fatal. Mpox is **not related** to chickenpox. **ACAM2000**, **MVA-BN**, and **JYNNEOS** are some of the vaccines available for the Mpox.

Background of Monkeypox

Mpox was discovered in **1958** when two outbreaks of a pox-like disease occurred in **colonies of monkeys** kept for research in **Denmark**.

- Despite being named "Monkeypox virus," the source of the disease remains unknown.
- However, **African rodents** and **non-human primates (like monkeys)** might harbour the virus and infect people.
- The first human case of Mpox was recorded in a nine-month-old boy in the **Democratic Republic of the Congo** (DRC) in **1970**.

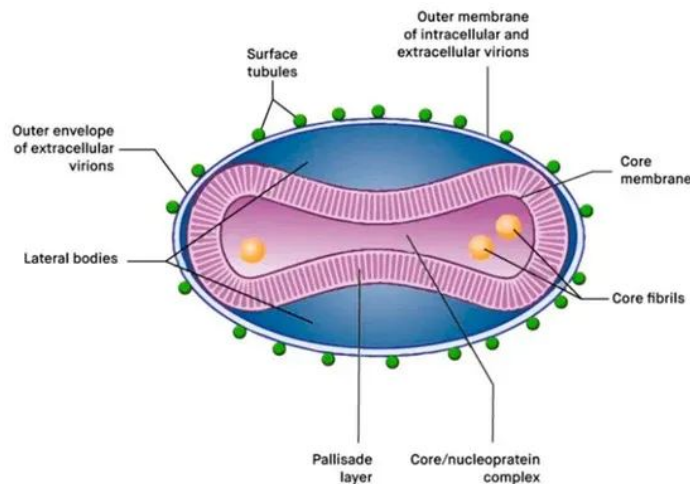
- Before the recent outbreak in 2022, Mpox had been reported in several central and west African countries.

About Monkeypox (MPX) Virus

The Mpox virus has several distinct characteristics based on the structure and specifications of the virus.

Structure

- The Monkeypox (MPX) virus has distinctive **surface tubules** and a **dumbbell-shaped** core component.
- It is an **enveloped virus** with a **double-stranded DNA genome** that belongs to the **Orthopoxvirus** genus of the **Poxviridae** family.



Variants

- The Mpox virus is categorised into two types i.e., **Clade I** and **Clade II**.
 - The **Clade I** type of Mpox virus has a **fatality rate of around 10%**.
- The infections that caused the recent outbreak of 2022-2023 are from **Clade II** (or **Clade IIb** specifically).
- Infections with **Clade IIb** are rarely fatal.
 - More than 99% of people who get this form of the disease are likely to survive.
 - However, people with severely **weakened immune systems** or younger children may **get seriously ill or die**.

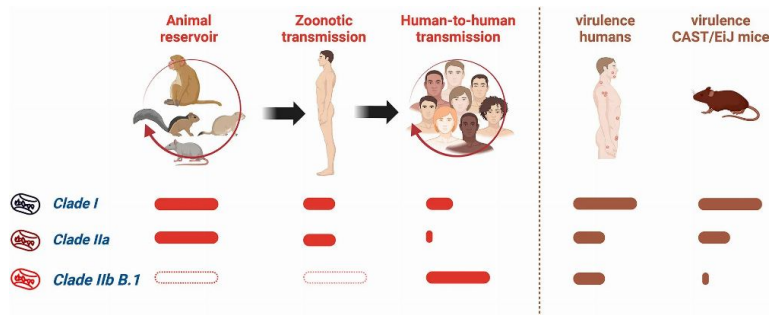
Symptoms of the Monkeypox

The symptoms that people face with Mpox are:

- **Rash:** It is a major symptom of Mpox as infected persons often get lesions and rashes. It may be located on **hands, feet, chest, face, or mouth** or near the **genitals**, including the penis, testicles, labia, vagina, and anus.
- **Other Symptoms:** There are other symptoms of Mpox that include **Fever, Chills, Swollen lymph nodes, fatigue, Muscle aches and backache, Headache**, and **Respiratory symptoms** (for example, sore throat, nasal congestion or cough).

Progression and Transmission of Monkeypox Virus

The disease Mpox is caused by the **monkeypox virus (MPXV)** which was first seen in monkeys kept for research. Mpox can also be caused due to **transmission** from person to person or from animal to person. Still, the natural reservoir of this virus is unknown.



Entry and Pathophysiology

- **Incubation period:** The Mpox virus can enter by multiple routes such as oral, nasal, or skin.
 - Then, the virus replicates at these sites and spreads to the local **lymph nodes**.
 - Further, the virus in the blood leads to spread and seeding into other organs.
 - This period typically lasts for **7 to 14 days (21 days maximum)**. During this time, a person does not have symptoms and may feel fine.
- **Symptom onset:** The secondary viremia leads to 1 to 2 days of prodromal symptoms (period between incubation and the characteristic symptoms) including fever and swelling of lymph nodes first and appearance of lesions later.
 - The patients may be contagious now.
 - Lesions appear first in the oropharynx followed by its appearance on the skin.
 - Serum antibodies are detectable when the lesions appear.

Transmission

- **Close or Intimate Contact:** Mpox can spread to anyone through close, personal, often skin-to-skin contact, including contact with an infected person as in:
 - Mpox rash and scabs from a person with Mpox.
 - Saliva, upper respiratory secretions (snot, mucus).
 - Areas around the anus, rectum, or vagina.
- **Touching Objects:** It is less likely but Mpox can get spread by touching surfaces which have not been disinfected.
 - By touching objects, fabrics, and surfaces
 - Clothing, bedding, towels, fetish gear, sex toys, etc.
- **Infected Animals:** Some animals can be infected with Mpox and spread it to people through close contact.
 - This is more likely with **wild animals**, specifically small **mammals** like **squirrels, rats, and mice** that live in areas where Mpox is endemic (such as in West and Central Africa).
 - It is possible that a pet could get infected and spread Mpox to a person during close contact.

- **Water In Pools, Hot Tubs:** There is no clear link between Mpox and water in pools, hot tubs, or splash pads.
- The Mpox **virus is killed** in water at the **chlorine** levels recommended for disinfection in recreational water venues.
- **Mpox and Pregnancy:** The Mpox virus can be transmitted to the fetus during pregnancy or to the newborn by close contact during and after birth.

Monkeypox Treatment

The goal of treating Mpox is to **take care of the rash, manage pain** and **prevent complications**. Early and supportive care is important to help manage symptoms and avoid further problems.

- **Isolation:** The persons infected by Mpox must be isolated and cared far away from other people.
- **Prioritising Vulnerable:** It is recommended for people at high-risk **health workers, sex workers**, etc to get vaccinated to prevent infection with Mpox during an outbreak.
- **Medications:** Several antivirals, such as **tecovirimat**, need to be made accessible to the persons infected.

Monkeypox Vaccines

The **ACAM2000, MVA-BN, and JYNNEOS vaccines** are the available vaccines for controlling the current outbreak.

- The vaccines should be given within **4 days of contact** with someone who has Mpox (or within **up to 14 days** if there are no symptoms).
- **MVA-BN:** It is a third-generation live, attenuated, nonreplicating, modified vaccinia Ankara vaccine.
- **ACAM2000:** It is a smallpox vaccine that is also a second-generation live, attenuated vaccinia virus vaccine.
- **JYNNEOS vaccine:** It is presently being used to treat monkeypox, and was developed using the **Modified Vaccinia Ankara (MVA)**.
 - It was employed in the **1970s German smallpox eradication** campaign to immunise more than 100,000 people.
 - This vaccine is more acceptable as it has limited adverse effects than **ACAM2000**.

Current Trends of Monkeypox

The **World Health Organization** had declared monkeypox a Public Health Emergency of International Concern (PHEIC) but **later removed** this designation in May 2023.

- **2022-2023 Outbreak:** The current outbreak of Mpox all over the world is very concerning because:
 - There are around 91,328 cases of Mpox across the world.
 - In the USA, there were 55 deaths reported out of 31,010 cases of Mpox.
 - **Cases in India:** India reported its first case of monkeypox in July 2022 with the patient having traveled from the UAE to **Kerala**.
 - Till July 2023, a total of 27 confirmed cases of monkeypox were reported in India, with 12 cases from **Kerala** and 15 from **Delhi**.

- Most of these cases were characterized as mild, and treatment remained largely supportive.
- **Re-infection after vaccination:** In June 2023, **Israel** detected a case of monkeypox in a man who had been vaccinated against the virus but contracted it after travelling from Portugal to Israel.
- **Clade 9 Variant:** In September 2023, the ICMR National Institute of Virology (ICMR-NIV) identified the presence of the Clade 9 variant of the varicella-zoster virus (VZV) in India for the first time.

India's Strategy to Deal with Monkeypox

The following are the initiatives taken by India to deal with monkeypox:

- **Hospitals Identified:** The **Ministry of Health and Family Welfare (MOHFW)** had proposed guidelines to tackle monkeypox in **three significant government hospitals** in Delhi.
- **Isolation Rooms:** The government has also taken steps to make isolation rooms operational in the dedicated hospitals. It was then enlarged to include an **additional 10 rooms** in three more hospitals.
- **Diagnosis:** Earlier, the **National Institute of Virology (NIV) Pune** was the **nodal** centre for monkeypox diagnosis by **RT-PCR test** (same used for COVID-19).
 - Later, ICMR gave permission to **15 additional institutions** to conduct the RT-PCR test for confirmation.
 - According to ICMR, all of the recovered monkeypox virus (MPXV) sequences from India are **lineages of the A2** which is of **clade 2b**.
- **Vaccines:** The **Smallpox** vaccine was reported to provide approximately **85% protection** against human Mpox.
 - After the **eradication of smallpox from India**, vaccination was discontinued in 1980.

Kerala's Strategy

- The State government has ordered the setting up of **screening desks** with **thermal scanners** at all airports and ports for early detection of potential spreaders.
 - Hence, suspected cases would be **quarantined**.
- The health department introduced **protocols for hospitals** and healthcare personnel like private hospitals would **not refer patients** with Mpox symptoms to government hospitals.
- **Surveillance medical officers** have been appointed in all 14 districts.

Way Forward

The best practices followed by countries around the globe can provide a direction to take steps as part of India's future strategy. The following are a few measures such as:

- **Vaccines for the Vulnerable:** In the UK, New York City, and Canada, vaccines are currently being provided by prioritising sections of people as per their vulnerability to the virus.
- **Training:** Providing proper academic training for medical practitioners.
- **Targeted Testing:** It is necessary to promote health in vulnerable populations with targeted testing and education that is compassionately supported.

- **Preventing Stigma:** To ensure that public health measures are appropriate and non-stigmatizing and to avoid messaging that will push the outbreak underground.
 - **Involvement of communities:** The communities must be involved from the beginning in structuring the implementation of measures.
 - **Precautionary Measure:** The use of Condoms is encouraged to prevent further spread.
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