Mpox Virus

Source: TH

Why in News?

Recently, a study revealed a novel **adaptation mechanism** of the **Mpox virus** enhancing its ability to infect humans amidst recent outbreaks.

- The name was changed from "monkeypox**" to "mpox"** to avoid stigma towards monkeys and reflect the virus's direct human infectivity.

What is Mpox?

- **About:**
  - Mpox, also known as monkeypox, is a **DNA virus**. It belongs to the ***family Poxviridae***, which consists of large, **double-stranded DNA** viruses.
    - The virus was first identified in monkeys in 1958 but has since been found to **infect humans as well.**
  - **Transmission:** Mpox is primarily transmitted to humans **from animals,** particularly **rodents and primates**, through direct contact or through contaminated objects.
  - **Symptoms:** Mpox infection in humans typically presents with **fever, headache, muscle aches,** and a characteristic rash that progresses from macules to papules to vesicles and pustules.
  - **Vaccination:** While a vaccine for mpox exists, its **availability and effectiveness** are **limited,** highlighting the need for improved prevention and control measures.
- **Global Outbreaks:** Mpox gained global attention during a widespread outbreak that affected over 100,000 people in more than 118 countries in 2022-2023.
  - The outbreak was characterised by high **human-to-human transmission**, particularly through **close contact and the sexual route.**
- **WHO Declaration:** The **World Health Organization (WHO)** declared the mpox outbreak a **public health emergency**, leading to coordinated efforts to control its spread.
- **Genomic Features:**
  - **Clades and Lineages:** Mpox genomes are divided into **clades I and II,** with evidence suggesting **clade I has higher mortality.**
    - The **2022 outbreak** involved a new lineage, **clade IIb,** better adapted for human-to-human transmission.
  - **Genomic Analysis:** Researchers found evidence of a **distinct lineage of clade I associated with human-to-human transmission**, suggesting a recent **zoonotic spillover event.**
  - **Evolutionary Adaptations:** Mpox viruses can undergo **genomic accordion** through gene duplication or deletion to adapt to different hosts and environments.
    - A study published in Nature Communications sequenced the genome of the mpox virus from the 2022 outbreak, revealing that certain sections **strongly influence** human-to-human transmission and are the virus's genomic accordions.

Note

- **Genomic accordion** refers to the **rhythmic expansions** and **contractions** in the size of a **virus's genome,** specifically observed in poxviruses like mpox.
    - This phenomenon is driven by the **duplication or deletion** of genes within the virus's genome, leading to changes in its size and content.

Difference Between Small Pox, Chicken Pox, Mpox

Feature	Smallpox	Monkeypox	Chickenpox
Virus	*Variola virus*	*Monkeypox virus*	*Varicella-zoster virus (VZV)*
Severity	Highly severe, often fatal	Milder than smallpox, rarely fatal	Mild
Status	Eradicated in 1980	Endemic in Central and West Africa, cases emerging elsewhere	Common childhood illness, less common due to vaccination
Transmission	Highly contagious through respiratory droplets and contact with infected lesions	Spread through contact with infected animals, lesions, or bodily fluids	Highly contagious through respiratory droplets and contact with lesions
Symptoms	Fever, headache, severe fatigue, vomiting, followed by a deep-seated, pus-filled rash	Fever, headache, swollen lymph nodes, followed by a rash that progresses through stages	Fever, fatigue, loss of appetite, followed by an itchy, fluid-filled rash
Vaccination	No longer needed	Not routinely recommended, may be given to high-risk individuals	Routine vaccination for children and adults who haven't had chickenpox

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims:

Q. The term ‘ACE2’ is talked about in the context of (2021)

(a) genes introduced in the genetically modified plants

(b) development of India’s own satellite navigation system

(c) radio collars for wildlife tracking

(d) spread of viral diseases

Ans: (d)

Q. Which of the following are the reasons for the occurrence of multi-drug resistance in microbial pathogens in India? (2019)

1. Genetic predisposition of some people
2. Taking incorrect doses of antibiotics to cure diseases
3. Using antibiotics in livestock farming
4. Multiple chronic diseases in some people

Select the correct answer using the code given below.

(a) 1 and 2

(b) 2 and 3 only

(c) 1, 3 and 4

(d) 2, 3 and 4

Ans: (b)

Mains:

Q. Critically examine the role of WHO in providing global health security during the Covid-19 pandemic. **(2020)**