



# Monkeypox Virus- A Potential Threat, Introduction, Epidemiology, Diagnosis, Clinical Features And Treatment.

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## ABSTRACT

Monkeypox is an emerging zoonotic disease caused by the monkeypox virus, a member of the Orthopoxvirus genus. The disease presents with symptoms similar to smallpox but is less severe and less contagious. Historically endemic in Central and West Africa, monkeypox has recently emerged as a global health concern, with outbreaks in non-endemic regions. The virus spreads through direct contact with infected individuals, animals, or contaminated materials. Diagnosis is primarily based on PCR testing, while treatment focuses on supportive care, antiviral medications, and vaccination. This paper explores the epidemiology, clinical features, diagnosis, and treatment of monkeypox, emphasizing the need for continued surveillance and global preparedness.

**Keywords:** Monkeypox virus, zoonotic disease, epidemiology, clinical features, diagnosis, treatment, antiviral therapy, vaccination, Orthopoxvirus.

## 1 INTRODUCTION

Currently an uncommon zoonotic illness, monkeypox is brought on by the monkeypox virus, which is a member of the Orthopox virus genus, Poxviridae family, and Chordopoxvirinae subfamily.

A smallpox-like illness is caused by monkeypox disease, which is closely linked to the variola virus (smallpox virus). According to historical statistics, immunization against smallpox with the vaccinia virus—an additional orthopox virus—was around 85% effective in preventing monkeypox.

In 1980, upon the successful eradication of smallpox, conventional vaccination recommendations were withdrawn.

The epidemiological characteristics of monkeypox epidemics were extensively reviewed in a prior study, which analyzed literature published until summer 2018.

The virus was first identified in monkeys in a Danish laboratory in 1958, which is where the term "monkeypox" comes from. (2)

The nucleocytoplasmic viruses in the Poxviridae family have large, 200–400 nm double-stranded deoxyribonucleic acid (DNA). Both optical and electron microscopy can identify them. Numerous creatures, including mammals, birds, insects, and reptiles, are infected by the broad family of viruses known as poxviruses. "Humans serve as the primary host and reservoir for Variola and Molluscum Contagiosum viruses."(4)

Since the 1970s, monkeypox has been endemic in 11 Western and Central African nations. The largest-ever epidemic of monkeypox disease in non-endemic nations began in May 2022, and by June 15, 2022, around 36 non-endemic nations had reported cases of the disease in their regions. While the majority of those afflicted experience a minor and self-limiting illness, pregnant women, children, and immunocompromised persons are known to experience rather severe results from the condition. (1)

## 2 EPIDEMIOLOGY

"Previously, a review studied the spread of monkey pox. But with new cases reported in Nigeria and elsewhere, we decided to update our knowledge. We analysed new research to see how monkey pox has changed since it was first discovered in the 1970s." (2)

Several possible hosts for the monkeypox virus have been discovered, despite the fact that the precise natural reservoir is unknown. Rope squirrels, tree squirrels, Gambian pouched rats, dormice, sooty mangabey, and non-human primates are among the animals that are susceptible to the monkeypox virus. One of the four harmful Orthopoxvirus species that affect people is monkeypox, a zoonotic viral illness. The other dangerous species that infect humans include the Vaccinia virus, the Cowpox virus, and the Variola virus, which causes smallpox.

Monkeypox spreads through direct contact with infected people or animals, and contaminated objects. It can be transmitted through contact with infected bodily fluids, contaminated items, or infected animals. The monkeypox virus has an incubation period of approximately 4-21 days.

Between August 2017 and August 2018, cases of monkey pox were reported in several African countries. A WHO conference was held in October 2017 to address concerns about the spread of the virus. According to the conference report, there has been a significant increase in reported cases of monkey pox worldwide over the past decade.

The literature has proposed and supported a slow rise in monkeypox case numbers from 1980 to 2013, but it is uncertain how much recent outbreaks fit into this pattern. Furthermore, concerns regarding a shift in the epidemiological pattern are raised by the recent apparent upsurge in monkeypox reports in places following a break. (3)

## 3 CLINICAL FEATURES

Monkeypox symptoms resemble smallpox, with a two-stage clinical progression.(4) The first stage of monkeypox usually lasts 0-5 days and can cause:

- Fever
- Severe headache
- Swollen lymph nodes
- Back pain
- Muscle pain

This stage is also known as the feverish stage or invasion phase." One characteristic that sets monkeypox apart from other illnesses that may first seem similar (smallpox, measles, and chickenpox) is lymphadenopathy.

The second stage is the skin eruption phase, which typically starts one to three days after the fever first appears. Rather than the trunk, the rash usually focuses more on the face and limbs. Common areas affected by the rash include the face, palms, soles, eyes, genital area, and mucous membranes.

The rash develops in stages, starting with macules and progressing to papules, vesicles, pustules, and finally crusts that eventually dry out and fall off. There might be a few thousand or thousands of lesions. Conjunctivitis and corneal scarring, vomiting and diarrhea, encephalitis, sepsis, and bronchopneumonia are among the often reported side effects. After the rashes go away, it might take days or weeks to fully heal. (1)

It was described as a viral prodrome temperature that lasted one to three days and comprised chills, headache, myalgias, and back discomfort.

A maculopapular exanthematous eruption ensued.

The rash changed over about two weeks. At first, it looked the same everywhere and spread from the centre of the body. Then, it turned into blisters, filled with pus, and finally formed a crust.

Although the virus that causes monkeypox can produce a state similar to smallpox, it has been shown to be less contagious and clinically milder. (5)

One key difference between smallpox and monkeypox is when the lymph nodes swell. For smallpox, this happens early on, usually when the fever starts. The skin rash can have just a few spots or thousands, and typically appears 1-3 days after the fever begins.

Pleiomorphic skin lesions on the face, palm, soles, or in the vicinity of the genitalia or anus are common in patients. But the rashes can also appear on other parts of the body, such as the mouth, eye, conjunctivae, and chest.

Up to four weeks may pass throughout the illness.

The best way to diagnose monkeypox virus is through a lab test called RT-PCR, which quickly detects the virus's genetic material. (4)

#### 4 DIAGNOSIS

Given that monkeypox typically strikes isolated communities in the tropical African rain forest, the patient's geographic location is crucial in the diagnosing process.

It's critical to distinguish this from chickenpox, which manifests in consecutive harvests, making lesions at different developmental stages evident at all times. The geographical distribution of chickenpox is "centripetal," with more infections on the trunk than on the face and extremities, in contrast to smallpox. Scabs can be sent to a referral laboratory for a conclusive diagnosis, where electron microscopy can identify the orthopoxvirus and distinguish it from varicella.

Another way to identify the virus is by analyzing its DNA after growing it in a lab.(5)

The most accurate way to diagnose monkeypox is by testing a skin sample using a PCR test. This test works well even if the sample has other bacteria on it. However, testing blood samples isn't usually helpful. (4)

To get a proper diagnosis, doctors recommend taking a swab from the back of the nose or throat. They may also take a small skin sample for testing.

Analysis should be done on a sample of the ceiling of an intact vesiculopustule or a specimen of the vesiculopustular rash.(5)

Monkeypox has a typical rash pattern and lymphadenopathy during the prodromal stage of illness(1) Diseases that present with rashes, including as chicken pox, measles, bacterial skin infections, scabies, syphilis, and medication-associated allergies, are crucial differential diagnoses.Lymphadenopathy and a characteristic rash pattern are features of the prodromal stage of monkeypox.(4)

People who had contact with monkeypox, got a fever and rash within 3 weeks, and had certain antibodies in their blood, but didn't have a positive lab test, were considered likely to

have been infected.

A key way to tell monkeypox apart from smallpox and chickenpox is by looking for swollen lymph nodes, especially in the neck, groin, and under the chin. The rash can be unclear, and people may also have inflammation in the throat, eyes, genitals, and mouth. (5)

## 5 TREATMENT

Without medical assistance, the majority of monkeypox patients recover. Antivirals, vaccine immunoglobulin (VIG), and supportive care are the primary methods of managing monkeypox. Furthermore, during the monkeypox infection, it is advised to treat secondary bacterial infections and control symptoms. (4)

The CDC recommends getting a smallpox vaccine within 2 weeks, and ideally within 4 days, after being in close contact with someone who has monkeypox or an infected animal. This can help prevent infection.

Getting vaccinated against smallpox provides significant protection against monkeypox. In fact, studies have shown that it's about 85% effective. This protection doesn't just last for a short time - it can last for years after getting vaccinated. Plus, if you do get monkeypox after being vaccinated, you're likely to have fewer complications. That's why smallpox vaccination is an important tool in preventing monkeypox.(5)

Medicines used to treat smallpox may also work for treating monkeypox, even though they weren't specifically designed for it. There are a few antiviral medications that can help, including tecovirimat, cidofovir, and brincidofovir. Tecovirimat is actually the top choice for treating smallpox in adults and children who weigh at least 28 pounds. Tecovirimat works by blocking a specific protein called VP37, which the virus needs to grow and spread. By blocking this protein, the virus can't mature or leave the infected cell, which helps stop the infection from spreading.

Additionally, tecovirimat increased survival rates in animals infected with deadly monkeypox. In human clinical trials, the treatment proved to be safe, with most patients experiencing only mild side effects. Patients with significant renal impairment (creatinine clearance < 30 mL/min) should not get tecovirimat injections. Headache, nausea, stomach discomfort, and vomiting are typical adverse effects.

Cidofovir, also known as Vistide is an anti-viral medication that works by inhibiting the virus DNA polymerase.

Severe renal toxicity is the major adverse effect of cidofovir. It is formulated intravenously.

Brincidofovir, also known as CMX001 or Tembexa (Chimerix Inc), is a prodrug of cidofovir, with an improved safety profile and less renal toxicity.

An orthopoxvirus nucleotide variant DNA polymerase inhibitor is brincidofovir. Tecovirimat is approved to treat smallpox in people of all ages, from newborns to adults. (4)

## Conclusion

Monkeypox remains a significant global health concern due to its increasing spread beyond endemic regions. While most cases are mild and self-limiting, the disease poses severe risks to immunocompromised individuals, children, and pregnant women. Advances in diagnostic methods, particularly PCR testing, have improved early detection, while antiviral treatments like tecovirimat and brincidofovir show promise in managing infections. Vaccination, particularly with smallpox vaccines, remains an effective preventive measure. Continued research, surveillance, and public health interventions are essential to contain future outbreaks and mitigate the threat posed by monkeypox.

## REFERENCES:

1. Monkeypox Disease Outbreak (2022): Epidemiology, Challenges, and the Way Forward  
CHANDRAKANT LAHARIYA, 1 ARCHANA THAKUR, 1 NONITA DUDEJA<sup>2</sup> From 1Foundation for People-Centric Health Systems, New Delhi; Lahariya, C. (n.d.). The changing epidemiology of human monkeypox—A potential threat.
2. Reference: Lahariya, C. (2023). The Evolution of Monkeypox: A Systematic Review.
3. Source Material: London School of Hygiene and Tropical Medicine. Beer, E. M., & Rao, V. B. - Human Monkeypox Outbreaks.
4. Monkeypox: Virology, Pathophysiology, Clinical Characteristics, Epidemiology, Vaccines, Diagnosis, and Treatments Marzieh Soheili<sup>1</sup> , Sherko Nasser<sup>2,3</sup> , Maryam Afraie<sup>4</sup> , Sorour Khateri<sup>5</sup> , Yousef Moradi<sup>4</sup> , Seyede Maryam Mahdavi Mortazavi<sup>6</sup> , Hamed Gilzad Kohan<sup>1</sup> .
5. Source Material: College of Veterinary Medicine, Addis Ababa University. Pal, M., et al. - Monkeypox Disease Review. Research Reference: Pal, Mahendra, et al. (2023). Epidemiology, Diagnosis, and Control of Monkeypox Disease.

