

## **MONKEYPOX (MPX)**

Associate Professor, Sri Manakula Vinayagar Nursing College

Kalitheerthalkuppam, Puducherry.

**MRS.SATHYAVATHY.G**

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### **I. Introduction**

Monkeypox (MPX) is a viral zoonotic disease with symptoms similar to smallpox, although with less clinical severity. MPX was first discovered in 1958 in colonies of monkeys kept for research, hence the name 'monkeypox.' The first human case of monkeypox was reported from Democratic Republic of the Congo (DRC) in 1970. The true burden of monkeypox is not known. In 2003, the first monkeypox outbreak outside of Africa was in the United States of America and was linked to contact with infected pet prairie dogs. This outbreak led to over 70 cases of monkeypox in the U.S. it has also been reported in travelers from Nigeria to Israel in September 2018, December 2019, May 2021, and May 2022, to Singapore in May 2019, and to the United States of America in July and November 2021. In May 2022, multiple cases of monkeypox were identified in several non-endemic countries.

#### **1. Incidence**

The World Health Organization (WHO) confirmed the global outbreak of monkeypox has grown to **more than 6,000** cases, with 80% in European countries. WHO Director-General Tedros Adhanom Ghebreyesus, Ph.D., said today that infections have been detected in 58 countries. Our World in Data lists 7,075 confirmed cases worldwide.



#### **2. Epidemiology**

##### **Agent**

Monkeypox virus (MPXV) is an enveloped double-stranded DNA virus that belongs to the *Orthopoxvirus* genus of the *Poxviridae* family.

##### **Host:**

The natural reservoir is yet unknown. However, certain rodents (including rope squirrels, tree squirrels, Gambian pouched rats, and dormice) and non-human primates are known to be naturally susceptible to the monkeypox virus.

##### **Incubation period:**

- The incubation period (interval from infection to onset of symptoms) of monkeypox is usually from 6 to 13 days but can range from 5 to 21 days.
- Period of communicability: 1-2 days before the rash until all the scabs fall off/get subsided.

**Mode of transmission:**

- Human-to-human transmission can result from close contact with respiratory secretions, skin lesions, rash or body fluids of an infected person, or recently contaminated objects.
- Touching objects, fabrics (clothing, bedding, or towels), and surfaces that have been used by someone with monkeypox.
- Animal-to-human (zoonotic) transmission can occur from direct contact with the blood, bodily fluids, or cutaneous or mucosal lesions of infected animals.
- Eating inadequately cooked meat and other animal products of infected animals is a possible risk factor. People living in or near forested areas may have indirect or low-level exposure to infected animals.
- Transmission can also occur via the placenta from mother to fetus (which can lead to congenital monkeypox) or during close contact during and after birth.

**3. Case definition**

**Suspected case:**

A person of any age having a history of travel to affected countries within the last 21 days presenting with an unexplained acute rash and one or more of the following signs or symptoms:

- Swollen lymph nodes
- Fever
- Headache
- Body aches
- profound weakness

**Probable case:**

A person meeting the case definition for a suspected case, clinically compatible illness and has an **epidemiological link**

**Confirmed case:**

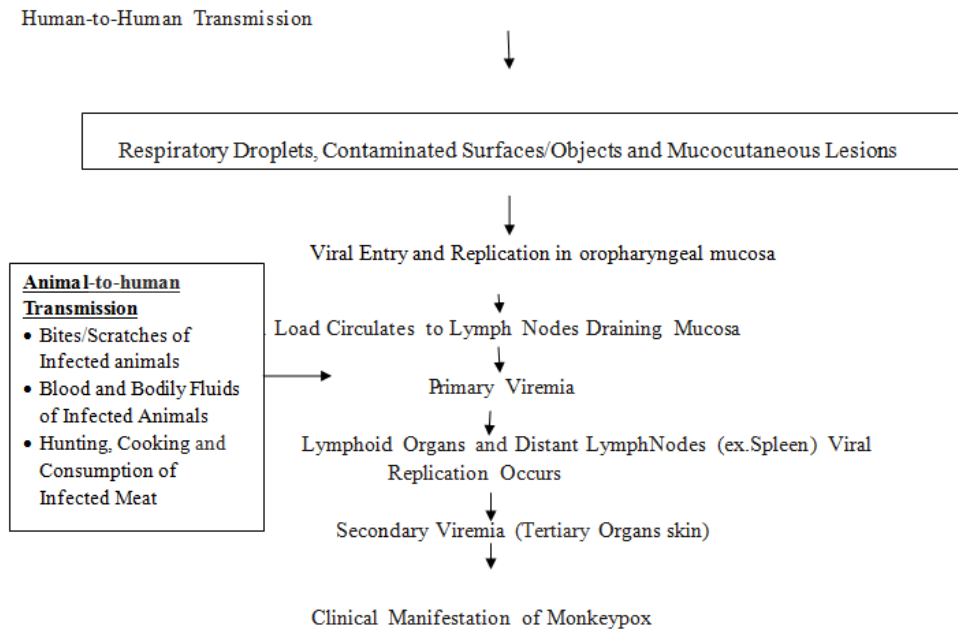
A case that is laboratory confirmed for monkeypox virus (by detection of unique sequences of viral DNA either by **polymerase chain reaction (PCR) and/or sequencing**).

**4. Surveillance Strategies**

- a) Isolate cases to prevent further transmission
- b) Provide optimal clinical care
- c) Identify and manage contacts
- d) Protect frontline health workers
- e) Effective control and preventive measures based on the identified routes of transmission.

**5. Pathophysiology**

Human-to-Human Transmission



## 6. Clinical manifestations

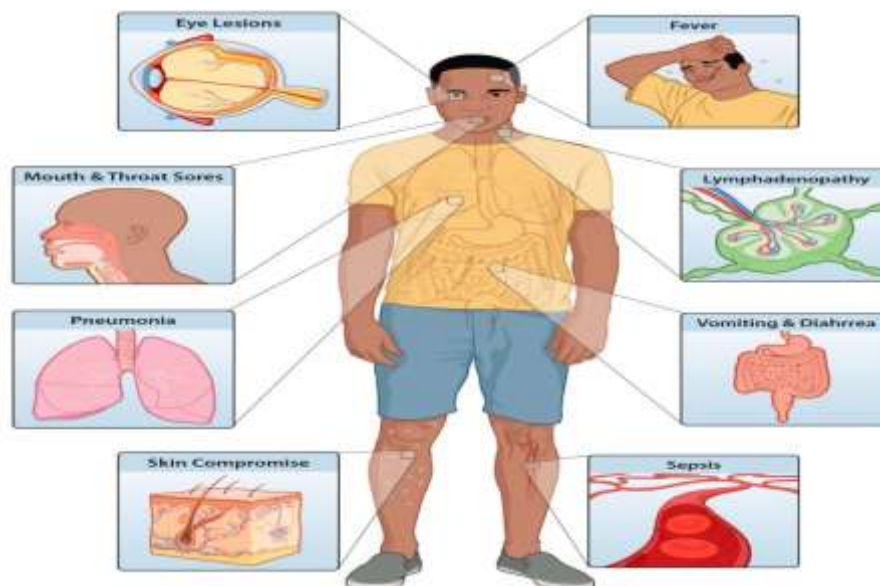
Monkeypox is usually a self-limited disease with symptoms lasting from 2 to 4 weeks.



- Prodrome (0-5 days)
  - a. Fever
  - b. Lymphadenopathy
    - Typically occurs with fever onset
    - Periauricular, axillary, cervical or inguinal
    - Unilateral or bilateral
  - c. Headache, muscle aches, exhaustion
  - d. Chills and/or sweats
  - e. Sore throat and cough



- Skin involvement (rash)
  - a. Usually begins within 1-3 days of fever onset, lasting for around 2-4 weeks
  - b. Deep-seated, well-circumscribed, and often develop umbilication
  - c. Lesions are often described as painful until the healing phase when they become itchy (in the crust stage)
  - d. Stages of rash (slow evolution)
    - Enanthem- first lesions on tongue and mouth
    - Macules start from the face spreading to arms, legs, palms, and soles (centrifugal distribution), within 24 hours
    - The rash goes through a macular, papular, vesicular, and pustular phase. Classic lesion is vesicopustular
    - **Involvement by area:** face (98%), palms and soles (95%), oral mucous membranes (70%), genitalia (28%), conjunctiva (20%). Generally, skin rashes are more apparent on the limbs and face than on the trunk.



- By 3<sup>rd</sup>-day lesions progress to papules
- By the 4<sup>th</sup> to 5<sup>th</sup> day, lesions become vesicles (raised and fluid-filled).
- By the 6<sup>th</sup> to 7<sup>th</sup>-day lesions become pustular, sharply raised, filled with opaque fluid, firm and deep-seated.
- May umbilicate or become confluent
- By the end of 2<sup>nd</sup> week, they dry up and crust
- Scabs remain for a week before falling off
- The lesion heals with hyperpigmented atrophic scars, hypopigmented atrophic scars, patchy alopecia, hypertrophic skin scarring, and contracture/deformity of facial muscles following the healing of ulcerated facial lesions
- A notable predilection for palm and soles is characteristic of monkeypox
- e. The total lesion burden at the apex of the rash can be quite high (>500 lesions) or relatively slight (<25).

## 7. Complications

- Secondary bacterial infection

- Bronchopneumonia,
- Septicemia
- Encephalitis
- Blindness
- Corneal ulceration
- Keratitis
- Respiratory distress
- Deforming scars
- Pitted scars
- The extent to which asymptomatic infection may occur is unknown.

**8. Diagnostic evaluation**

- a) **PCR:** Orthopoxvirus genus [Cowpox, Buffalopox, Camelpox, Monkeypox]
- b) **IgM testing:** IgM testing is considerably less sensitive than PCR testing of skin lesions; a positive IgM ELISA result, although suggestive of primary infection, does not exclude re-infection.
- c) **A blood sample:** To check for the monkeypox virus or antibodies
- d) **Tzanck smear:** the presence of multinucleated giant cells suggests a virus infection
- e) **Immunohistochemical staining:** skin lesion scrapings can confirm the virus.
- f) Virus isolation by cell culture

**9. Vaccination**

Two vaccines may be used for the prevention of *Monkeypox virus* infection:

- 1. JYNNEOS (also known as Imvamune or Imvanex), licensed (or approved) by the U.S. Food and Drug Administration (FDA) for the prevention of *Monkeypox virus* infection, and
- 2. ACAM2000, licensed (or approved) by FDA for use against smallpox and made available for use against monkeypox under an Expanded Access Investigational New Drug application.

**10. Management**

**Principles of Management**

- Patient isolation
- Protection of compromised skin and mucous membranes
- Rehydration therapy and Nutritional support
- Symptom alleviation
- Monitoring and treatment of complications

**Supportive management**

- Monitoring and treatment of complications
- **The patient should closely monitor for the appearance of any of the following symptoms during the period of isolation:**
  - Pain in the eye or blurring of vision
  - Shortness of breath, chest pain, difficulty in breathing
  - Altered consciousness, seizure
  - Decrease in urine output
  - Poor oral intake
  - Lethargy

Component of management	Symptoms/Signs	Management
Protection of compromised skin and mucous membranes	Skin rash	<ul style="list-style-type: none"> <li>• Clean with simple antiseptic</li> <li>• Mupironic Acid/Fucidin</li> <li>• Cover with light dressing if extensive lesion present</li> <li>• Do not touch/ scratch the lesions</li> <li>• In case of secondary infection, relevant systematic antibiotics may be considered</li> </ul>
	Genital ulcers	<ul style="list-style-type: none"> <li>• Sitz bath</li> </ul>
	Oral ulcers	<ul style="list-style-type: none"> <li>• Warm saline gargles/ oral topical anti-inflammatorygel</li> </ul>

	Conjunctivitis	<ul style="list-style-type: none"> <li>• Usually, self-limiting</li> <li>• Consult Ophthalmologist if symptoms persist or if there are pain/ visual disturbances</li> </ul>
Rehydration therapy and nutritional support	Dehydration can occur in association with poor appetite, nausea, vomiting and diarrhea	<ul style="list-style-type: none"> <li>• Encourage ORS or oral fluids</li> <li>• Intravenous fluids if indicated</li> <li>• Encourage a nutritious and adequate diet</li> </ul>
Symptom alleviation	Fever	<ul style="list-style-type: none"> <li>• Tepid sponging</li> <li>• Paracetamol as required</li> </ul>
	Itching/Pruritus	<ul style="list-style-type: none"> <li>• Topical Calamine lotion</li> <li>• Antihistaminics</li> </ul>
	Nausea and vomiting	<ul style="list-style-type: none"> <li>• Consider anti-emetics</li> </ul>
	Headache/ malaise	<ul style="list-style-type: none"> <li>• Paracetamol and adequate hydration</li> </ul>

## 11. Prevention

### A. Reducing the risk of infection in people In outbreaks, most significant risk factor is close contact:

- Raise awareness of the risk factors
- Education on measures to reduce exposure to the virus
- Surveillance measures

### B. Rapid identification of new cases Public health educational messages should focus on the following risks:

- Reduce risk of animal-to-human transmission
- Avoid contact with rodents and primates
- Limit direct exposure to blood and meat
- Thorough cooking of meat prior to consumption
- Personal protective equipment should be worn while handling sick animals, infected tissues and in slaughtering procedures

### C. Controlling infection in health-care settings

- Standard infection control precautions among health workers in caring for suspects and confirmed case and their specimens
- Immunization of health workers against smallpox Older smallpox vaccines should not be administered to immune- compromised people.
- Suspected samples should be handled by trained staff working in suitably equipped laboratories
- In transporting samples, ensure safe packaging and follow infectious substances guidelines.

### Clinicians

- High index of suspicion when symptoms are present
- Specimen Collection
- Effective communication and precautions between specimen collection teams and laboratory staff is essential
- Clear labelling systems for all infected samples
- Proper sample collection techniques
- Laboratory personnel
- Laboratory exposures to poxviruses occurs primarily through:
  - Needle pricks
  - Direct contact with specimen
  - Aerosols generated by lab procedures
  - Limit number of staff testing specimens
- PPE
- Rigorously applied standard precautions
- Avoid any procedures that could generate infectious aerosols

### Veterinarians :

- Consider all mammals as susceptible to monkeypox
- Beware of animal-to-animal transmission
- Ensure good hand hygiene, waste disposal, environmental sanitation, laundry
- In treating suspected animals use PPE, protect staff, clients and other animals

- Preventing monkeypox expansion through restrictions on animal trade
- Restrict/ban the movement of small African mammals and monkeys
- Isolate/quarantine potentially infected animals
- Quarantine all contact animals, handle with standard precautions and observe for monkeypox symptoms for 30 days

## 12. Nursing management

- **History taking:** The history should elicit if a recent outbreak of monkeypox in the community
- **Pain relievers and fever reducers:** ibuprofen (Advil, Motrin) and acetaminophen (Tylenol) to relieve pain and fever.
- **Oatmeal baths:** Soaking in a warm bath with colloidal oatmeal can relieve the dry, itchy feeling that comes with skin rashes.
- **Isolate:** Avoid contact with others until all lesions have scabbed.
- **Cover single or local lesions:** Use gauze or bandages to limit spread to others and the environment.
- **Take good care:** It's important to stay home and rest, wear a mask around others and drink plenty of fluids.
- **Avoid contact with pets (especially rodents).**
- **Patient education:** Educate parents about the importance and safety of the Varicella Zoster vaccine.
- **Manage pruritus:** cool compresses and regular bathing; warm soaks and oatmeal or cornstarch baths may reduce itching and provide comfort.
- **Trim fingernails:** Trimming the fingernails may reduce scratching.
- **Dietary measures:** Advise parents to provide a full and unrestricted diet; some children with varicella have reduced appetite and should be encouraged to take sufficient fluids to maintain hydration.
- Don't shake bedding, towels, or clothing, which may release airborne droplets.
- **Immunizations:** It should also be noted has previously received is immunocompromised (including recent systemic steroid use) to help guide management.
- **Clean and disinfect:** contaminated surfaces with a standard household disinfectant.
- Place soiled dressings and disposable medical equipment in a plastic bag and place it in another container for disposal with the household trash.
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## 13. Nursing diagnosis:

1. Hyperthermia related to viral infection.
2. Impaired skin integrity related to mechanical factors (eg: stress, tear, friction).
3. Disturbed body image related to lesions on the skin.
4. Deficient knowledge about the condition and treatment needs.
5. Risk for infection related to damage skin tissue.

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