Original Article

# MONKEY POX: A NEW CONCERN

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## Abstract

Monkey pox is an infectious viral disease which spread from animals to humans. This virus is a new concern, as recently the identification of emerging cases of monkey pox virus other than African Continent in May 2022.It showed its spread in other parts of world because of international tourism and exchange of certain animals . Hence it is important to evaluate and discuss the management of monkeypox infections in humans to prevent the spread of the disease. The objective of this review is discuss the spread of monkey pox disease world-wide, study its symptoms for prompt identification of the disease with the aim to abolish all possible modes of transmission to protect public health and to prevent the possibility of spread of another pandemic, after COVID-19.

**KEYWORDS:** Monkeypox, Zoonotic, Smallpox, Ortho Poxvirus, Human, Animals

## INTRODUCTION

Monkeypox is a viral disease in which a virus is transmitted to humans from animals also called *Zoonosis.[1]* Its symptoms are similar to smallpox disease, although it is clinically milder.[1] Monkeypox primarily occurs in African Continent, especially in central and west parts, nearby tropical rainforests. But now it has been increasingly in modern urban areas[1]. Animal hosts include a range of rodents and non-human primates.[2]
In 1958 Monkey pox virus was recognized as a viral-disease[2]. Although, the first confirmed human case was identified In 1970, from a child in Congo. Mostly cases of monkey pox are occurred in African Continent's interior region.[3] Hence , possibility is many suspected cases goes neglect, that's why potential threat of Monkey pox to humans is still not confirm..[2]

## ETIOLOGICAL AGENT

Monkeypox is a viral disease. It is from the family: *Poxviridae*, subfamily chordopoxvirinae, genus: orthopox virus[1], and species: Monkeypox virus. It is an enveloped double-stranded DNA virus that belongs to the *Orthopoxvirus*[2,3] genus of the *Poxviridae* family. On electron microscopy, the size of monkeypox virus is around (200-250 nano-meters). They are in shape of cuboid , surrounded by a lipoprotein layer around a double-stranded DNA .[2] Monkeypox virus contain all essential proteins for their survival except mRNA translation, for which they depends on ribosomes of host-cell..[2]

## NATURAL HOST OF MONKEYPOX VIRUS

Various animals of African region have been identified as most probably containing monkey pox virus.[3] It includes monkeys and squirrels, and other animal species of African Continent.[1] Natural history of the monkeypox virus is still not known hence more studies are essential to identify the accurate reservoir(s) and how this virus exist in natural diversities.[4]

## EPIDEMIOLOGY

Monkey pox is a zoonotic disease, endemic to central and western African continent. In 2003, fifty-three human cases of monkey pox were reported in United States.[1, 3]

In May 2021, a case reported in U.K. in which a family got infected by Monkey pox virus, after the family returned from Nigeria.[2] One by one all family-members showed symptoms on (day 0, day 19, day 33) which proved transmission of virus in human-to-human.[2] Since 2017, Nigeria has reported a large number of cases of Monkey pox, with over 500 suspected cases and over 200 confirmed cases with case fatality ratio of approximately 3%[4].
In May 2022, numerous cases of monkey pox were reported in many non-endemic countries.[3] Further investigations and case-studies are going on to understand the widely spread of disease, sources of infection, and mode of transmission.
There are no reported cases of **monkey pox virus in India** till date as on 31st May 2022.

**PATHOPHYSIOLOGY & TRANSMISSION**

Monkey pox can transmit via all types of fluids of body[2], dermal lesions, or by coughing or sneezing of infected animals or by contaminated fomites. In Monkey pox, two types of transmission were reported:

- Zoonotic transmission- In which virus transmitted from animals to humans.
- Human to human transmission - In which virus transmitted from humans to humans.

**Animal-to-human (zoonotic)[1] transmission** occurs via all types of fluids from body, or by dermal lesions of infected animals . Because of tropical climate in Africa, prevalence of monkeypox virus infection is more favourable ,hence virus found in many animals of this region[4],.[3] Consumption of raw or half-cooked meat and other animal products of infected animals is a possible cause.[5] People living in or near forested areas may have natural indirect or low-level exposure to infected animals.

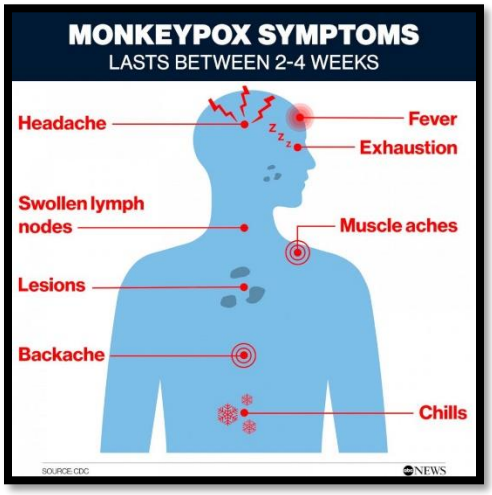
**Human-to-human transmission[1]** can occur as a result of close contact by coughing or sneezing, dermal lesions of an infected person or objects used by infected person. The most common is coughing or sneezing.[5] Hence close contact or face-to-face contact, puts health workers, household members and other close contacts of active cases at more risk. Transmission can also occur by the placenta from mother to fetus[5] (which can lead to congenital monkeypox) or during close contact during and after birth.[1] Although close physical contact is the commonest risk factor for transmission, but it is still not clear if monkeypox can be transmitted through sexual transmission routes.[6] Further studies are needed to better understand this route of transmission.
The incubation period (interval from infection to onset of symptoms) of monkey pox lasts from 6 to 13 days to 5 to 21 days.[1] The period of infection can be divided into two phases[5]:

- The **invasion** period (which lasts between 0–5 days) is characterized by increase body-temperature, headache, enlarged lymph nodes , pain in back and muscle along with lethargy[2, 3] After virus enters into body, it uncoats its lipid layer and forms millions of its copies which cause viremia ,later on it spreads to regional lymph nodes.[2] As a result, enlarge lymph nodes occurs which gave rise to viral spread to other organs.
- The **skin eruption** initiates within 1–3 days of the appearance of fever.[6] The rash are coalesce on the face rather than ther body-parts[3]. It affects the facial -region (in 95% of cases), and palms of the hands and soles of the feet (in 75% of cases).[6]

**SYMPTOMS**

The primary symptom of Monkeypox is that the virus causes visible -rash or pox spread all over the body-surface. Apart from the pox, Monkeypox can cause increase in body-temperature and pain in whole body .[7]Other symptoms include enlarge lymph nodes and lethargy.[3] Serum antibodies are easily detects as soon as lesions appear.[8] Rashes gives appearance of chickenpox or syphilis.[7] which often begins on the face and later-on spread to other body-parts

.The rash transforms through different stages.[2] Its size around 2 to 10 mm initially and firm, deep-seated lesion.[3] Rashes convert into the pustular phase for 5




**(Figure. 1)**

to 7 days which ultimately change into crusts . Subsequently Crusts undergo desquamation in around 7 to 14 days[4]. In brief, the condition resolves around 3 to 4 weeks after symptom onset in most cases. Patients are considered safe after desquamation .[3]


**Figure:2**

( Primary Inoculation Reactions (Panels A, B, and C), Examples of the Smallpox-like (Panel D) and Umbilicated Varicella-like (Panel E) Disseminated Monkeypox Lesions, and the Morphologic Appearance of Disseminated Lesions over Time (Panels F, G, H, and I).[3]

## ORAL MANIFESTATIONS

Oral mucous membranes affect in 70% of cases of Monkeypox infection. Initially rashes occurs as a typical oral manifestation, which change into a flat base lesion to slightly raised firm lesions,. It convert in sometimes to circumscribed fluid-filled lesions ,out of which convert into pus and at last crusts forms which dry up and

desquamatte.[4] Lesion enlarges and the number of lesions may be rise from few to thousand[9]. In severe cases, lesions can merge and at last large sections of skin slough off.[6] After the crust fallen-off, the patient considered non-infectious.[10]

## DIAGNOSIS

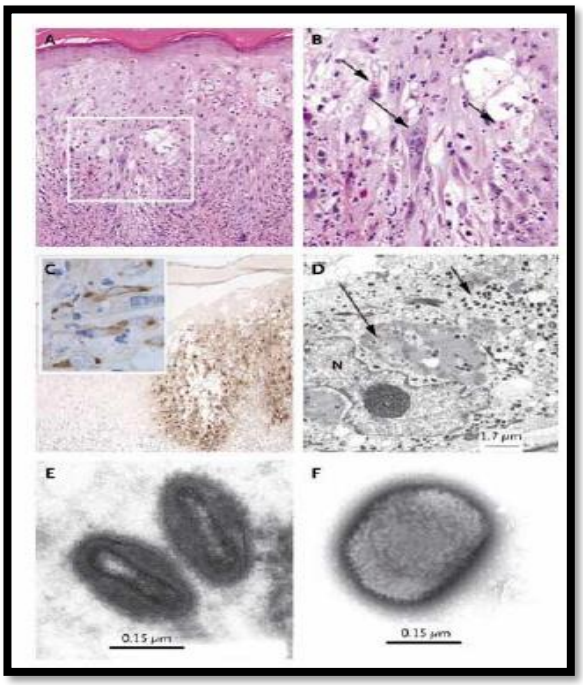
Rashes are the first clinical sign of monkeypox. The clinical differential diagnosis based on rash formation, such as other dermal lesion eg. smallpox, chickenpox, measles.[5] Swollen lymph-nodes during the initial stage of disease is a significant feature by which identification of monkeypox from chickenpox or smallpox occurs.[2]

**Table No. 1 Differential Diagnosis**

| **Features** | **Monkey Pox** | **Chicken Pox** | **Small Pox** |
|---|---|---|---|
| Causative Virus | Monkey Pox Virus | Varicella Zoster Virus | Variola Virus |
| Symptoms | Fever, pus-filled boils, initially appearing on face | Fever with itchy rash, firstly appearing on the chest, back and face | Fever, small red spots on tongue, pus-filled boils on face, arms and legs |
| Appearance of symptoms | -21 days | 10-21 days | 7-19 days |
| Duration of illness lasts | 2-4 weeks | 4-7 days | Up to 5 week |
| Fatality | 1-10 %of cases ,depends on strain | Rare | Up to 30 % of cases, depends on type |

## LABORATORY INVESTIGATIONS

Clinical and epidemiologic criteria and symptoms strongly indicates monkeypox infection, but confirmation through laboratory evidence is always necessary.[11] Sections of formalin-fixed, paraffin-embedded skin-biopsy specimens are routinely use at the pustular stage and stain with hematoxylin and eosin.[3]




**(Figure:3)**

A typical marked ballooning degeneration of keratinocytes with epidermal necrosis and spongiotic edema is evident (**Figure: 3A**). [3]

A moderate admixed inflammatory infiltrate appreciate within the epidermis and superficial dermis. Multiple multinucleated keratinocytes are seen with margination of chromatin along with eosinophilic cytoplasmic inclusions are also present. (**Figure: 3B**).[3]

Immuno-histochemical staining detects Orthopox viral antigen in skin-biopsy specimens by reaction with rabbit anti-vaccine polyclonal antibody (Virostat) (**Figure:3** C).[3]
Virions in various stages are also evident in transmission electron microscopy on glutaraldehyde-fixed skin-biopsy specimens. (**Figure: 3 D**).[3] Cross sections of mature virions contained dumbbell-shaped cores, is a characteristic of poxviruses (**Figure:3E**).[3]
Confirmed diagnosis done by Polymerase chain reaction (PCR).[1] For this, samples for monkeypox viruses are taken from the roof or fluid from fluid-filled lesions and from desquammated crusts[1]. Samples must be stored at 4 degree temperature in a dry, sterile condition.[4]. Serology and antigen detection methods are not suggested for diagnosis.

## MANAGEMENT

The advised treatment is supportive symptomatic management.[6] The infected person should isolated ,with surgical mask put on and covered the lesions to eliminate the possibility of spread of infection.[2]
In few cases, administration of vaccine after illness is highly suggested, Ankara vaccine, a live vaccine is recently introduced, which is a combination of both smallpox and monkey pox vaccine.[12] According to the CDC, vaccination within four days of disease may be effective to limit the disease outbreak, and vaccination within 14 days may decrease acute symptoms of disease . Ankara vaccine which, acts on replication of virus, gives in two doses with a time-gap of four weeks, for maximum protection.[2]
Also a newer antiviral agent known as tecovirimat (in U.S.) that was originally developed for smallpox, is now advised by the European Medicines Agency (EMA) for cure of monkey pox in 2022. It is not easily available. Also further researches are going on to study its effectiveness.

## PROGNOSIS

The Monkeypox virus has two major strains, namely the Congo strain[1] (with up to10% mortality) and the West African strain[1] (fatality rate of 1%) in the total reported cases. Hence, Congo or Central Basin clade (Central African clade), is more harmful, with a higher case fatality rate.[2] Patients usually fully recover within four weeks of symptom onset only a mild scarring and discoloration of the skin remain as a Potential Complications. Super-infection of Bacteria, Permanent skin scarring, Hyperpigmentation or hypopigmentation and permanent corneal scarring (vision loss) are some other side-effects.[7]
Advance and accessible medical facility, proper testing, and infrastructure limits to treat neglected tropical disease.[13] Policies and effective defense management are made to strengthened defense against monkeypox.[14]Sometimes complication are proven lethal as it convert into Dehydration, Sepsis, Encephalitis and finally Death.[15]

## CONCLUSION

Monkey pox is a viral disease which spreads in humans from animals, those resides nearby in tropical rainforest areas of African Continent and is occasionally exported to other parts of the world. Symptoms resolved within 2-4 weeks by itself. Severe cases can occur. Monkey pox is transmitted to humans via coughing, sneezing of infected person or animal, or through all types of body-fluids and from contact with belongings of infected person.
The main prevention strategy for monkey pox is giving information of risk factors and educating people. Local containment of the affected animal is the best defence against the worldwide spread.
It is necessary for a healthcare worker to promptly identify monkey pox infection in humans and animals, so that they can implement protective measures, against this virus and hence prevent the spread of disease.

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