

Monkeypox: An Overview

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ABSTRACT

The monkeypox virus is a dual-stranded DNA virus that infects humans and other animals. It originally belonged to the Orthopoxvirus genus and the Poxviridae family. It is a human Orthopoxvirus, along with variola, cowpox, and vaccinia viruses. It is neither a progenitor nor a successor of the variola virus, which causes smallpox. Monkeypox is similar to smallpox but has a milder rash and a lesser mortality rate.

Keywords: Antiviral treatment, Orthopoxvirus, Smallpox.

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INTRODUCTION

Monkeypox is an extremely contagious zoonotic disease caused by a virus transferred from animals to humans, with clinical features related to those initially shown in smallpox patients, but with fewer drastic changes clinically.^{1,2}

Monkeypox has emerged as a significant Orthopoxvirus for public health since the eradication of smallpox in 1980 and the subsequent suspension of smallpox vaccination.³ Monkeypox is found predominantly in Central and West Africa, particularly near tropical rainforests, but it is also becoming more common in urban areas. Animal hosts tend to involve rodents and different creatures.⁴

Monkeypox is a remarkable viral disease caused by an infection with the monkeypox virus. It belongs to the Orthopoxvirus genus of the Poxviridae family. The Orthopoxvirus genus includes the vaccinia virus (used in smallpox vaccine), cowpox virus, and variola virus (which causes smallpox).⁵

EPIDEMIOLOGY OF MONKEYPOX

In 1958, two outbreaks of a pox-like disease in monkey-research colonies prompted the name “monkeypox”. According to WHO data, the majority of cases of monkeypox were also reported from rural, rainforest regions of the Congo Basin since 1970, especially in the Democratic Republic of the Congo, where it is currently considered endemic.⁶

Monkeypox’s natural reservoir has yet to be discovered. Despite this, non-human primates (such as monkeys) and African rodents may carry the virus and infect humans. Only twice has the virus that causes monkeypox been recovered (isolated) in nature.⁷ The virus was discovered in an obviously sick African rodent in the Democratic Nation of the Congo’s Equateur Region in 1985 (rope squirrel). In the second study, the virus was recovered from a deceased infant mangabey discovered in Cote d’Ivoire’s Tai National Park (2012).⁸

RISK FACTORS OF MONKEYPOX

According to the WHO, the case fatality ratio of monkeypox in the general population has ranged from 0 to 11% and has been higher in small children. Despite the fact that monkeypox is a self-limiting disease, a variety of factors influence the severity of

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the infection, including patient health, age, the type of sequelae, and exposure.⁹

The virus is most dangerous to children under the age of 5. Devouring raw animal flesh and other infected animal products may be dangerous. Many studies have found that sleeping in the same room or bed, as well as sharing daily use things, are potential risk factors for monkeypox within a household.

SIGNS AND SYMPTOMS OF MONKEYPOX

Monkeypox has an incubation period of 7–14 days, but it can be as short as 5–21 days. There are two types of symptoms seen during a monkeypox virus attack: invasion and skin rash.

- The invasion period (lasts 0–5 days) is described by severe headache, back pain, fever, severe asthenia (lack of energy), lymphadenopathy (lymph node swelling), and myalgia (muscle aches). Lymphadenopathy distinguishes monkeypox from other initially similar diseases (smallpox, chickenpox, and measles).
- The skin rash usually appears 1–3 days after the fever. The rash usually appears on the face and extremities rather than the trunk.
- It primarily affects the palms of hands and face. Oral mucous membranes (70%) soles of feet (in 75% of cases), conjunctivae (20%), genitalia (30%), and the cornea are all affected. Macules (flat-based lesions) are followed by papules (firm, slightly raised lesions), vesicles (clear liquid lesions), pustules (yellowish fluid-filled lesions), and crusts that dry out and completely collapse. The count of lesions can vary between hundreds and thousands. In severe cases, lesions can merge.¹⁰

Typically, the illness usually lasts 2–4 weeks. Monkeypox has been shown to kill up to one in every ten people in Africa who contract the disease. The major difference between monkeypox and smallpox illnesses is that monkeypox induces lymphadenopathy (swelling of the lymph nodes), whereas smallpox does not.¹¹

DIAGNOSIS OF MONKEYPOX

Monkeypox confirmation based on the type and quality of the specimen, in addition to the kind of laboratory test, is used. As a result, specimens must be wrapped and dispatched in conformity with national and international regulations.¹²

Due to its accuracy and sensitivity, the polymerase chain reaction (PCR) is the most commonly used laboratory test. The fluid from vesicles and pustules, but also dry crusts are ideal diagnostic samples for monkeypox. When applicable, biopsy is an option. Cold lesion samples must be kept in a sterile, dry tube (no viral transport media). Due to the limited length of viral load relative to the duration of specimen collection after symptoms occur, PCR blood tests are usually ambiguous and should not be routinely collected from patients.¹³

Despite the fact that Orthopoxviruses are serotypes sensibility, antigen, and immune response diagnosis techniques cannot confirm monkeypox.¹² Patient information such as (i) Fever-onset date, (ii) Rash-onset date, (iii) Specimen collection date, (iv) Individual's current situation (stage of rash), and (v) Age must be provided with the specimens in order to interpret test results.¹²

TRANSMISSION OF MONKEYPOX

The virus can be transmitted to a person by an animal, a human, or contaminated materials if they come into contact with it. The virus spreads through open wounds in the skin, the respiratory tract, or mucous membranes (eyes, nose, or mouth). A bite or scratch, preparation of bush meat, direct contact with body fluids or lesion material, or indirect contact with lesion material, such as through contaminated bedding, can all result in animal-to-human transmission.¹⁴

The main mode of human-to-human transmission is thought to be large respiratory droplets. Because these droplets can only transit only limited meters, it is necessary to sustain extended face-to-face contact. Other methods of transmission between humans include direct contact with body fluids or lesion material, such as indirect contact with lesion material, such as through infected clothing or linens. Monkeypox complications include serious infections like encephalitis, corneal infection, bronchopneumonia, and sepsis with subsequent vision loss. It is unknown how widespread asymptomatic infection can be.¹⁵

PREVENTION OF MONKEYPOX

To avoid infection with the monkeypox virus, several precautions can be taken:

- The primary prevention strategy for monkeypox is to increase public understanding of risk variables and teach people on how to minimize virus exposure.
- Avoid contact with virus-infected animals that are sick or have died in monkeypox-outbreak areas.

- Do not handle any items that have been in direct contact with a sick animal, such as linens.
- Keep infected patients separate from others who may be infected.
- After coming into contact with infected animals or humans, practice good hand hygiene. Washing your hands with soap and water, for example, or using an alcohol-based hand sanitizer.¹⁶

When caring for patients, wear personal protective equipment (PPE). JYNNEOSTM (also referred to as Imvamune or Imvanex) is a monkeypox vaccine that has been approved by the Food and Drug Administration of the United States. The Advisory Committee on Immunization Practices (ACIP) is currently testing JYNNEOSTM for the health and safety of workers at risk of exposure to Orthopoxviruses such as smallpox and monkeypox in a pre-event setting.^{2,17}

TREATMENT OF MONKEYPOX

A smallpox vaccine, antivirals, and vaccinia immune globulin (VIG) can be used to control a monkeypox outbreak in the United States (VIG). Monkeypox virus infection seems to have no proven, safe treatment.²

VACCINIA IMMUNE GLOBULIN (VIG)

Vaccinia immune globulin is only used with an IND and has not been proven to be effective in treating smallpox complications. But it is unspecified if either VIG treatment will assist a person with a severe monkeypox infection, it must be presumed in certain cases. There is no evidence that VIG is effective in treating monkeypox complications.

When smallpox vaccination after monkeypox exposure is contraindicated, VIG may be considered for prophylactic use in a vulnerable person with severe immunodeficiency in T-cell function.²

ANTIVIRAL TREATMENT

The study also tested the efficacy of two antiviral medications, brincidofovir, and tecovirimat, which have traditionally been used to treat smallpox. Tecovirimat is now approved for the treatment of monkeypox in the European Union and the United States. It is not approved for this use in the United Kingdom.¹⁸

Although brincidofovir treatment reduced viral load in the short term, these developments were not sustained, and the patients developed side effects affecting the liver, necessitating an early discontinuation of treatment.

Although the researchers cannot say whether this was a direct result of tecovirimat treatment, the findings suggest that tecovirimat may help to prevent the progression of severe disease and shorten hospital stays. They recommend a 2-week course of treatment to completely eliminate the virus.¹⁹

CONCLUSION

Monkeypox infection is a prevalent virus that may cause more infections than previously thought, according to confirmative diagnostics research conducted across Africa. If a virulent strain of monkeypox is initiated into an environment where individuals have little or no Orthopoxvirus immunity, the virus may be able to exploit this child-like population, potentially resulting in an epidemic.

More research is required to identify the role of each gene in virulence and whether genetic factors predicted to transmit segments of proteins with known features maintain several activities. This knowledge may aid in determining what made a variola virus so successful.¹⁸

REFERENCES

- Koppers-Lalic D, Hoeben RC. Replication-competent Non-human Viruses for Use in Clinical Gene Therapy: An Inventory Study. *Bilthoven: COGEM* 2010.
- Weinstein RA, Nalca A, Rimoin AW, Bavari S, Whitehouse CA. Reemergence of monkeypox: Prevalence, diagnostics, and countermeasures. *Clinical infectious diseases* 2005;41(12):1765–1771. DOI: 10.1086/498155.
- Petersen E, Abubakar I, Ihekweazu C, Heymann D, Ntoumi F, Blumberg L, et al. Monkeypox—Enhancing public health preparedness for an emerging lethal human zoonotic epidemic threat in the wake of the smallpox post-eradication era. *Int J Infect Dis* 2019;78:78–84. DOI: 10.1016/j.ijid.2018.11.008.
- Parker S, Nuara A, Buller RM, Schultz DA. Human monkeypox: An emerging zoonotic disease. *Future Microbiol* 2007;2(1):17–34. DOI: 10.2217/17460913.2.1.17.
- Damon IK. Status of human monkeypox: Clinical disease, epidemiology and research. *Vaccine* 2011;29(Suppl 4):D54–D59. DOI: 10.1016/j.vaccine.2011.04.014.
- Reynolds MG, Damon IK. Outbreaks of human monkeypox after cessation of smallpox vaccination. *Trends Microbiol* 2012;20(2): 80–87. DOI: 10.1016/j.tim.2011.12.001.
- Nakazawa Y, Emerson GL, Carroll DS, Zhao H, Li Y, Reynolds MG, et al. Phylogenetic and ecologic perspectives of a monkeypox outbreak, southern Sudan, 2005. *Emerg Infect Dis* 2013;19(2): 237–245. DOI: 10.3201/eid1902.121220.
- Pauli G, Blümel J, Burger R, Drosten C, Gröner A, Gürtler L, et al. Orthopox viruses: Infections in humans. *Transfus Med Hemother* 2010;37(6):351–364. DOI: 10.1159/000322101.
- Sejvar J. Neuroepidemiology and the epidemiology of viral infections of the nervous system. *Handb Clin Neurol* 2014;123: 67–87. DOI: 10.1016/B978-0-444-53488-0.00003-1.
- Reynolds MG, Yorita KL, Kuehnert MJ, Davidson WB, Huhn GD, Holman RC, et al. Clinical manifestations of human monkeypox influenced by route of infection. *J Infect Dis* 2006;194(6):773–780. DOI: 10.1086/505880.
- Ježek Z, Szczeniowski M, Paluku KM, Mutombo M. Human monkeypox: Clinical features of 282 patients. *J Infect Dis* 1987;156(2):293–298. DOI: 10.1093/infdis/156.2.293.
- World Health Organization. Laboratory testing for the monkeypox virus: Interim guidance, 23 May 2022. World Health Organization; 2022.
- Nitsche A, Stern D, Ellerbrok H, Pauli G. Detection of infectious poxvirus particles. *Emerg Infect Dis* 2006;12(7):1139–1141. DOI: 10.3201/eid1207.060093.
- Usman S, Adamu II. Modeling the transmission dynamics of the monkeypox virus infection with treatment and vaccination interventions. *J Appl Math Phys* 2017;5(12):2335. DOI: 10.4236/jamp.2017.512191.
- Vaughan A, Aarons E, Astbury J, Balasegaram S, Beadsworth M, Beck CR, et al. Two cases of monkeypox imported to the United Kingdom, September 2018. *Euro Surveill* 2018;23(38):1800509. DOI: 10.2807/1560-7917.ES.2018.23.38.1800509.
- Petersen E, Kantele A, Koopmans M, Asogun D, Yinka-Ogunleye A, Ihekweazu C, et al. Human monkeypox: Epidemiologic and clinical characteristics, diagnosis, and prevention. *Infect Dis Clin* 2019;33(4):1027–1043. DOI: 10.1016/j.idc.2019.03.001.
- Roess AA, Monroe BP, Kinzoni EA, Gallagher S, Ibata SR, Badinga N, et al. Assessing the effectiveness of a community intervention for monkeypox prevention in the Congo basin. *PLoS Negl Trop Dis* 2011;5(10):e1356. DOI: 10.1371/journal.pntd.0001356.
- Diaz JH. The disease ecology, epidemiology, clinical manifestations, management, prevention, and control of increasing human infections with animal orthopoxviruses. *Wilderness Environ Med* 2021;32(4):528–536. DOI: 10.1016/j.wem.2021.08.003.
- Baker RO, Bray M, Huggins JW. Potential antiviral therapeutics for smallpox, monkeypox and other orthopoxvirus infections. *Antiviral Res* 2003;57(1–2):13–23. DOI: 10.1016/s0166-3542(02)00196-1.