Monkey Pox Symptom Identification, Cause, Treatment and Infection Control Prevention

Vicia Dara Wandira[1]*, Rifki Adrian Syach[1]
[1]Faculty of Health, Medicine, and Natural Sciences, Airlangga University, Banyuwangi, East Java, Indonesia.
Corresponding author: vicia.dara.wandira-2020@fkh.unair.ac.id

ABSTRACT

Monkey pox is a zoonotic disease that is re-emerging and proliferating in areas where it has not been observed for decades. Monkey pox outbreaks have been documented periodically in the past. Significant outbreaks occurred in Nigeria during 2017-2018, as well as in the United States and Nigeria. The research method used was a literature evaluation, specifically covering literature collected from multiple sources relating to monkey pox disease. Monkey pox is caused by the monkey pox virus. The disease is endemic in Central and West Africa. Human cases have recently spread to additional locations. No cases of monkey pox have been reported in Indonesia. Monkey pox in humans has similarities to smallpox; however, the symptoms are usually less severe. The monkey pox virus is present in skin lesions and in throat and nasopharyngeal swabs. Monkey pox is self-limiting. Treatment is palliative. Transmission of the disease can be reduced by avoiding direct contact with wild animals. In conclusion, monkey pox is a zoonotic disease caused by the monkey pox virus. The disease is self-limiting. The treatment given is symptomatic. The recommended method to prevent transmission is to avoid contact with sick individuals or animals.
Keywords: monkey pox, symptoms, causes, management, prevention

Received: 16-10-2024 **Revised:** 15-11-2024 **Accepted:** 25-11-2024

INTRODUCTION

The emergence of a new outbreak caused by monkey pox virus infection raises additional concerns for public health authorities and the global community following the COVID-19 pandemic. Monkey pox, a zoonotic disease, is caused by the monkey pox virus (Sinto, 2022). The virus belongs to the genus *Orthopoxvirus* in the family *Poxviridae* (Rizk, 2022). The World Health Organization (WHO) declared monkey pox an emergency epidemic of global health concern and anticipates an increase in known cases (WHO, 2022).

Monkey pox is a disease caused by the monkey pox virus (*Orthopoxvirus*, Family *Poxviridae*), which was identified when this pox-like disease manifested in colonies of animals, particularly monkeys, kept for research purposes. As a result, the infection caused by this disease is called monkey pox. The first documented case in humans was found in the Democratic Republic of Congo (DRC/Zaire) in 1970, occurring in endemic rural areas, particularly the tropical forests of the Congo Basin and West Africa (Bunge et al., 2022).

Monkey pox is a zoonotic disease caused by *Orthopoxvirus* in the family *Poxviridae*. The virus was initially identified in a sick monkey transported to a Danish research facility from Singapore in 1958, while the first human case was detected in a child in Congo in 1970. Monkey pox is endemic in the Democratic Republic of Congo, Benin, Cameroon, Central African Republic, Gabon, Ghana (only found in animals), Ivory Coast, Liberia, Nigeria, Sierra Leone and South Sudan. Since May 13, 2022, a case of monkey pox has

been documented in a non-endemic region (Soheili, 2022). The first case of monkey pox in a non-endemic region was documented in the UK on May 7, 2022, following travel to Nigeria. On May 14, 2022, two new cases of monkey pox were confirmed in individuals who had no history of travel to Africa and any interaction with previous cases. This is a contemporary problem (Zumla, 2022).

The disease can infect humans and is transmitted through direct contact, rodents and undercooked meat. Inoculation infection occurs through direct contact with lesions on the skin or mucosa of infected animals (Petersen et al., 2019). The first case of monkey pox in Indonesia has been identified. After additional research, one Indonesian resident tested positive for monkey pox, with a history of international travel, most likely having contracted the virus through intimate contact with an infected person. Given the potential for animal-borne transmission of monkey pox in Indonesia, Indonesians should remain vigilant and prepared for the disease. This article aims to disseminate information and educational studies on monkey pox to the public, focusing on various aspects of preparedness and awareness of the disease to make it easier to understand (Kemenkes RI, 2022).

Based on the above background, the author is interested in conducting a literature study on Identification of Monkey Pox (Monkeypox) symptoms, Causes & Management and Prevention of Infection Control.

METHODS

This research is a qualitative research that is a library study (*library research*) that uses books and other literatures as the main object The type of research used is qualitative, which is research that produces information in the form of notes and descriptive data contained in the text under study (Adlini, 2022).

RESULT AND DISCUSSION

Clinical symptoms

The documented incubation period in humans generally lasts 6-16 days, while it can vary from 5-21 days, with an average of 12 days in Africa and 14.5 days during outbreaks in the United States (Russo, 2021). Monkey pox in humans has similarities to smallpox, presenting with a rash and systemic symptoms; however, the manifestations are usually less severe, and, in contrast to smallpox, lymphadenopathy is commonly observed. The condition usually begins with vague influenza-like symptoms, which can include *malaise*, fever, chills, headache, sore throat, *myalgia*, back pain, fatigue, nausea, vomiting, and unproductive cough. Lymphadenopathy can be localized or diffuse, mainly affecting the submandibular, postauricular, cervical and/or inguinal lymph nodes (Adler, 2022).

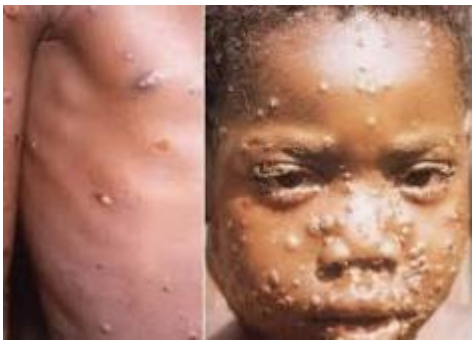

Figure 1. Monkeypox

Most patients show a rash one to several days after the onset of the disease; however, there are cases where patients observe multiple skin lesions (for example, at the site of an animal bite or scratch, or in the groin) immediately before feeling unwell. Skin lesions are usually localized to the extremities (especially palms and soles), but can

also occur on the head, chest, mucous membranes and genitals. The number ranges from less than 25 to more than 100, and may merge in severe cases. In animals, skin lesions often begin as *macules* and *papules*, progress to *vesicles* and *pustules*, navel, develop scabs, and eventually detach. During the outbreak in the United States, certain pustules had *erythematous flares*. Such flares have not been observed in African cases, probably due to the predominance of individuals with darker skin. The dermatologic lesions usually disappear within 14 to 21 days. Residual *varioliform scars*, characterized by *hypopigmented* and/or *hyperpigmented* skin lesions, may occur as *sequela* in selected cases. Severe scars, represented by pox, are rare (Patauner, 2022).

Certain patients have ocular manifestations such as conjunctivitis, or more rarely, *keratitis* or *corneal ulcers*. Respiratory problems such as bronchopneumonia, coagulation abnormalities, and rare occurrences of encephalitis or multiorgan failure have been documented. Secondary bacterial infections may arise and may lead to *sepsis*. Pregnant women may terminate the pregnancy or deliver an infected fetus. One infected baby in utero was stillborn, with maculopapular skin lesions and significant liver involvement; another presented with skin lesions and was born prematurely but survived. At least one pregnant woman with minimal disease gave birth to a healthy, full-term baby. The majority of patients recover within 2 to 4 weeks; however, death remains possible, especially in those infected with the Congo Basin *clade* or in people with weakened immune systems infected with one of the clades. Subclinical and minor cases have also been documented (Velavan, 2022).

Etiology

Monkey pox is caused by a virus belonging to the family *Poxviridae*, subfamily *Chordopoxvirinae*, genus *Orthopoxvirus*, and species Monkeypox virus. Monkey pox virus is a large double-stranded DNA virus, about 200-250 nm in size. Compared with RNA viruses, monkey pox virus has greater stability and efficacy in identifying and reducing the harm caused by mutations (Zumla, 2022).Monkey pox virus is oval or brick-shaped and resembles smallpox virus (*variola*). The core genome of monkey pox virus shares 96% similarity with smallpox virus, which is related to enzymes and viral structural proteins. The difference between the two viruses lies in the terminal region of the genome, which regulates the virulence and host range of the virus (Bung, 2022).

Monkey pox and smallpox exhibit almost identical symptoms; however, the manifestations of monkey pox are not as severe as chickenpox. The monkey pox virus is categorized into two variants: the Central African type (Congo Basin) and the West African type. The Central African variety (Congo Basin type) is more common and can be transmitted between people. This variant results in increased symptom severity, morbidity, mortality and viremia (WHO, 2022).

Differences between the two variants are determined by genomic architecture; for example, the open reading frame (ORF) of the Central African type affects virulence, viral life cycle, range of susceptible hosts and viral evasion strategies against the immune system. The Central African variant can inhibit T cell activation, suppress inflammatory cytokine synthesis, block complement action, and selectively reduce host responses, thereby increasing viral pathogenicity (WHO, 2022).

Management

Overall, monkeypox infection in humans is mild to moderate and self-limiting. The disease usually resolves itself with symptoms lasting from 14 to 21 days. Cases with severe symptoms are more common in children and immunocompromised patients related to virus exposure, patient health status and severity of complications (Lukito, 2019). The main treatment of monkeypox infection is the provision of supportive therapy. The aim of supportive therapy is to accelerate healing of the lesions, prevent fever, reduce fluid loss, reduce pain, and prevent scarring (Hraib, 2022).

The supportive therapy includes adequate and balanced fluid administration (there is a possibility of increased fluid loss from skin lesions, reduced fluid intake, symptoms of vomiting or diarrhea). Other therapies include hemodynamic management, supplemental oxygen and other respiratory management, and treatment of bacterial superinfection of skin lesions if indicated. Another treatment that needs to be considered in monkeypox infection is the management of infection and complications in the eye, especially the formation of corneal scarring and/or loss of vision. This can be achieved by involving consultation with an ophthalmologist, lubricants, topical antibiotics and topical antivirals such as trifluridine (Titanji, 2022).

To date, no specific therapy for monkeypox has been authorized by the US Food and Drug Administration (FDA). Several antiviral agents have been used that are thought to have activity against smallpox infection in experimental animals, but research data and use in Monkeypox infection are still limited. Some of these antiviral agents include cidofovir, brincidofovir, and tecovirimat. Antiviral therapy is considered only for patients with severe symptoms and requiring hospitalization, patients with severe symptoms involving ocular (eyes), oral, perianal, and patients at high risk of worsening symptoms such as immunocompromised individuals, children under 8 years of age, pregnant or lactating women, and patients with active exfoliative skin diseases (Sinto, 2022).

Cidofovir was previously used for the treatment of cytomegalovirus (CMV)-induced retinitis patients with AIDS. This drug works by inhibiting viral DNA synthesis through competitive inhibition of DNA polymerase. The dose of cidofovir used is 5 mg/kg per time, once a week intravenously and can be used in more than 2 doses. Brincidofovir (which is a fat conjugate prodrug for cidofovir) was previously used for the treatment of smallpox, CMV infection, adenovirus, and OPXV infection. The dose given is 4 mg/kg once a week for two doses (maximum 200 mg/dose) orally (Titanji, 2022).

Tecovirimat is used for the treatment of smallpox and cowpox infections. This agent works by inhibiting the activity of the VP37 protein which prevents the formation of virions that will be released from infected host cells, thus preventing replication and dissemination in the host. The dose of tecovirimat given intravenously is for body weight 35-120 kg: 200 mg per 12 hours, for body weight >120 kg is 300 mg per 12 hours. Oral administration of tecovirimat is divided for body weight 40-120 kg: 600 mg per 12 hours, and for weight >120 kg: 600 mg per 8 hours. Treatment with tecovirimat is given for 14 days. The main antiviral drug currently used for monkeypox infection is tecovirimat (Titanji, 2022).

Patients infected with monkeypox need to be educated that the lesions that appear on the face and extremities are

important to keep from scratching and becoming sores. If there are erosive papules or pustules or blisters, topical sodium fusidate cream or mupirocin cream can be given. Physiologic NaCl compresses can be applied once a day to crusted lesions. Squeezing nodules, papules, or vesicles is not recommended as it may increase the spread to other areas. The use of moisturizers can be given if the skin feels dry (Dashraath, 2022).

Patients infected with Monkeypox may be treated in isolation to prevent transmission especially during the eruption phase. In addition, patients are also susceptible to secondary infections due to decreased immune system. Isolation can be done independently or centrally in the hospital, by ensuring a minimum distance of 1 meter between patients. Isolation and transmission-based precautions should be continued until symptoms disappear (including resolution of rashes and scabs that disappear and heal). In pregnant women infected with monkeypox, if the infection causes symptoms (symptomatic), it is necessary to hospitalize and administer antiviral therapy (Dashraath, 2022).

Prevention and control of infection

Close contact tracing is an important step in reducing Monkey Pox transmission. Anamnesis is required for Monkey Pox patients to confirm close contact. Types of contact include face-to-face interactions, direct physical contact (including sexual intercourse), and contact with contaminated materials (fomites) such as bed sheets, towels, or common objects. In healthcare settings, individuals with a history of contact with patients should be identified. Individuals known to have had close contact with patients should be observed for symptoms including fever, chills, and rash for 21 days after the last exposure (Titanji, 2022).

Initiatives to reduce transmission in endemic areas should prioritize avoiding contact with rodents and primates, limiting direct exposure to animal blood and meat, and ensuring proper boiling before consumption. Avoid close personal contact with individuals suffering from Monkey Pox or with contaminated materials. Implementing hygienic practices, such as consistent hand washing with soap and water or using alcohol-based hand sanitizers, is part of preventive measures. Patients are instructed not to share objects, towels, or clothing (Sinto, 2022).

Patients suspected of having monkey pox should be isolated in a negative air pressure room; if not available, they can be placed in a separate room. Patients are encouraged to wear a surgical mask over the nose and mouth for as long as tolerated and cover open skin wounds with a cloth. Health workers caring for confirmed patients or managing patient specimens should adhere to conventional infection prevention and control protocols (Sinto, 2022). To date, there is no specific vaccine to prevent monkey pox infection; however, previous studies have shown that smallpox vaccine can provide protection against monkey pox due to immunologic cross-reaction among viruses of the same genus, with an estimated efficacy of 85% (Sinto, 2022).

The vaccines considered are based on the Vaccinia virus. Smallpox vaccinations suitable for pre-exposure and post-exposure prophylaxis include MVA-BN (JYNNEOS), LC16, and ACAM2000. The ACAM2000 vaccine is derived from live Vaccinia virus which is capable of replicating and is associated with severe side effects, including progressive vaccinia and myocarditis. In contrast, the MVABN vaccine (JYNNEOS or Imvamune/Imvanex) is a non-replicating vaccine derived from a

modified Vaccinia Ankara virus. The ACAM2000 vaccine is given as a single dose, but the JYNNEOS vaccine is given in two doses at 28-day intervals (Ajmera, 2022). According to WHO guidelines, post-exposure prophylactic immunization (PEP) may be given after exposure to certain populations, including pregnant women, children, immunocompromised individuals and HIV-infected patients. The recommended vaccines for pregnant and lactating women are MVA-BN and LC16. Administration of ACAM 2000 vaccination is prohibited during pregnancy and lactation (WHO, 2022).

In addition, in various countries including the UK, US, and Canada, PEP vaccination has been given to close contacts who experience high-risk exposure (direct contact of compromised skin or mucous membranes with body fluids, lesions, or skin of individuals infected with monkey pox, and close contact with patients undergoing aerosol-generating procedures without mask protection) as well as health care professionals exposed to the infection. The CDC recommends that the PEP vaccine be administered within 4 days of exposure to prevent disease. Vaccination given 4-14 days post-exposure may alleviate symptoms, although it may not prevent disease (CDC, 2022).

CDC currently recommends providing PrEP (pre-exposure prophylaxis) immunization for laboratory personnel handling monkey pox virus samples. In reaction to the ongoing monkey pox outbreak, PrEP immunization has been provided in Canada for homosexual, bisexual, and men who have sex with men (MSM) demographics. People suspected or confirmed of having monkey pox should be separated from family members and pets in a separate room. Infected people should avoid close contact with others. The isolation period should last until all lesions are fully healed and a new layer of epidermis forms underneath. In medical environments, the use of personal protective equipment (PPE) such as medical gowns, gloves, well-fitting N-95 masks, and eye protection is strongly recommended (Titanji, 2022).

CONCLUSION

Monkey pox is a zoonotic disease caused by the monkey pox virus. The clinical manifestations of monkey pox are similar to chickenpox, characterized by a rash and systemic indications, but usually present with less severe symptoms. Certain patients show visual manifestations. Possible complications include *bronchopneumonia*, blood clotting problems, encephalopathy and multiorgan failure. Monkey pox is self-limiting, with symptoms persisting for 14 to 21 days. Treatment is symptomatic. Transmission of the disease can be reduced by avoiding direct interaction with wild animals. Chickenpox immunization can provide protection to certain healthy individuals at high risk of exposure. Sodium hypochlorite disinfectant has been found to be effective against this virus.

REFERENCES

Adler, H., *et. al.,* (2022). Clinical features and management of human monkeypox: a retrospective observational study in the UK. The Lancet Infectious Diseases, 22(8), 1153–1162.

Adlini, M. N., Dinda, A. H., Yulinda, S., Chotimah, O., & Merliyana, S. J. (2022). Metode penelitian kualitatif studi pustaka. *Jurnal Edumaspul*, *6*(1), 974-980.

Ajmera KM, Goyal L, Pandit T, Pandit R. (2022).Monkeypox – An emerging pandemic. IDCases. 2022 Jan 1;29.

Bunge, E. M., Hoet, B., Chen, L., Lienert, F., Weidenthaler, H., Baer, L. R., & Steffen, R. (2022). The changing epidemiology of human monkeypox—A potential threat? A systematic review. PLoS Neglected Tropical Diseases, 16(2).

Centers for Disease Control and Prevention. (2022). Patient's Guide to Monkeypox Treatment with Tecovirimat (TPOXX). CDC.

Dashraath P, Nielsen-Saines K, Mattar C, Musso D, Tambyah P, Baud D. (2022). Guidelines for pregnant individuals with monkeypox virus exposure. Vol. 400, The Lancet. Elsevier B.V.; 2022. p. 21–2.

Hraib M, Jouni S, Albitar MM, Alaidi S, Alshehabi Z. (2022). The outbreak of monkeypox 2022: An overview. Vol. 79, Annals of Medicine and Surgery. Elsevier Ltd; 2022.

Kemenkes RI. (2022). Kasus Monkeypox Pertama di Indonesia Terkonfirmasi. Sehat Negeriku - Biro Komunikasi & Pelayanan Publik Kementerian Kesehatan RI. .http://infeksiemerging.kemkes.go.id

Lukito JI. Tatalaksana Monkeypox. (2019). Available from: https://www.who.int/en/news

Patauner F, Gallo R, Durante-Mangoni E. (2022). Monkeypox infection: An update for the practicing physician. European Journal of Internal Medicine. Elsevier B.V.

Petersen, E., *et al.,* (2019). Monkeypox — Enhancing public health preparedness for an emerging lethal human zoonotic epidemic threat in the wake of the smallpox posteradication era. In International Journal of Infectious Diseases (Vol. 78, pp. 78–84). Elsevier B.V.

Rizk JG, Lippi G, Henry BM, Forthal DN, Rizk Y. (2022). Prevention and Treatment of Monkeypox. Drugs. 1;82(9):957–63.

Russo, A. T., Grosenbach, D. W., Chinsangaram, J., Honeychurch, K. M., Long, P. G., Lovejoy, C., Maiti, B., Meara, I., & Hruby, D. E. (2021). An overview of tecovirimat for smallpox treatment and expanded anti-orthopoxvirus applications. In Expert Review of Anti-Infective Therapy (Vol. 19, Issue 3, pp. 331–344). Taylor and Francis Ltd.

Sah R, Abdelaal A, Reda A, Katamesh BE, Manirambona E, Abdelmonem H, *et al.,* (2022). Monkeypox and Its Possible Sexual Transmission: Where Are We Now with Its Evidence? Vol. 11, Pathogens. MDPI.

Sinto R, Shakinah S, Pitawati NLP, Rondonuwu MR, Hastuti EB. (2022). Pedoman Pencegahan dan Pengendalian Penyakit Monkeypox [Internet]. Jakarta: Kementrian Kesehatan Republik Indonesia; Available from: http://infeksiemerging.kemkes.go.id

Soheili, M., Nasseri, S., Afraie, M., Khateri, S., Moradi, Y., Maryam Mahdavi Mortazavi, S., Gilzad Kohan, H., Gastroenterology Fellowship, P., & Kohan, G. (2022). Monkeypox: Virology, Pathophysiology, Clinical Characteristics, Epidemiology, Vaccines, Diagnosis, and Treatments. In J Pharm Pharm Sci (www.cspsCanada.org) (Vol. 25). www.cspsCanada.org

Titanji BK, Tegomoh B, Nematollahi S, Konomos M, Kulkarni PA. (2022). Monkeypox: A Contemporary Review for Healthcare Professionals. Vol. 9, Open Forum Infectious Diseases. Oxford University Press.

Velavan TP, Meyer CG. (2022). Monkeypox 2022 outbreak: An update. Vol. 27, Tropical Medicine and International Health. John Wiley and Sons Inc; 2022. p. 604–5.

WHO. Monkeypox. (2022). Available from: https://www.who.int/news-room/fact-sheets/detail/monkeypox

WHO. (2022). Multi-country monkeypox outbreak in non-endemic countries: Updates. 2022. Available from: https://www.who.int/emergencies/diseaseoutbreak-news/item/2022-DON388

Zumla A, Valdoleiros SR, Haider N, Asogun D, Ntoumi F, Petersen E, *et al.* (2022). Monkeypox outbreaks outside endemic regions: Scientific and social priorities. Lancet Infect Dis. 2022.

***