



## MINI REVIEW

# Monkeypox Virus: Transfer from Endemic Areas to Non-Endemic Areas Due to Ease of Travel

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## Abstract

Monkeypox is a viral infection with skin manifestations. After the identification of this virus more than fifty years ago, more or less cases were observed in endemic countries. The spread of the disease to non-endemic countries has also occurred through the transmission of infected monkeys as the main host of the virus. Today, with the development of international vehicles, the risk of spreading viral diseases to different parts of the world has increased. A sick person can reach several countries and other hosts before the symptoms of the disease appear. Using our experiences in the COVID-19 pandemic, we should propose suitable and special solutions such as accelerating vaccination and diagnostic kits with high accuracy and speed. These strategies should be given more attention through international cooperation in African and endemic countries.

## Keywords

Monkeypox virus, Pandemic, COVID-19, Vaccination

## Abbreviations

COVID-19: Coronavirus disease 2019; MPXV: Monkeypox Virus; VARV: Variola Virus; CPXV: Cowpox Virus; CMLV: Camelpox virus; Real-Time PCR: Real-Time Polymerase Chain Reaction

## Introduction

While efforts were being made to identify the latest smallpox samples, several reports of smallpox-like disease among non-human primates were presented. After the isolation of the virus, it was confirmed that it is not the causative agent of smallpox. The first documentation of the first monkeypox virus (MPXV) is available in 1958 by von Magnus, et al. They reported a non-fatal smallpox-like outbreak in Macaque

cynomolgus monkeys in Copenhagen. These monkeys were imported from Singapore [1]. Several years later, other reports of MPXV were published. With increasing cases of MPXV, the World Health Organization employed research institutes to investigate the status of MPXV in animals, and finally five outbreaks in different parts of the world were confirmed by isolation of MPXV [2].

After more than two decades of multiple reports of monkeypox in non-human primates, the first reports of human infection with MPXV were published in 1970. The first cases of MPXV infection in six patients with smallpox-like symptoms from the Democratic Republic of the Congo, Liberia, and Sierra Leone were investigated by multiple laboratories, each of which confirmed MPXV. Most of the patients were children. In this report, the symptoms of the disease are mild and no death has been reported. In the reported areas, there are many monkeys that may be slaughtered by people and their meat or skin used [2-4]. MPXV is a double-stranded, linear DNA genome of 200 Kbp enclosed within a brick-shaped virion. MPXV is classified in the family Poxviridae and genus Orthopoxvirus. Other viruses of this family include variola virus (VARV), vaccinia virus (VACV), cow pox virus (CPXV), camel pox virus (CMLV) and several other new species. Members of the Poxviridae have many genes in their genomes that encode many enzymes, making the virus redundant from many of the cellular enzymes required for viral replication. Some genes are conserved and are necessary for virus replication, but some other viral genes play a role in virus-host interaction and do not play a vital role in virus replication [5].



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Although in the early years of detection of MPXV in non-human primates, the cases and the severity of the disease were few, gradually the concerns increased with the increase of cases and the increase in the geographical scope of the detected cases by entering the 21<sup>st</sup> century. So after several years after the first confirmed human case, more than a thousand other cases of human MPXV were identified and confirmed by reference laboratories from Central African and West African countries [6]. For example, after the first reports of MPXV in the Democratic Republic of the Congo in the 70s and 80s of the twentieth century, according to the available data from 2000 to 2019, thousands of suspected cases have been reported in the Democratic Republic of the Congo [7,8]. After several decades of absence of MPXV in West African countries such as Nigeria, from 2017 until today, there have been numerous reports of human MPXV outbreaks. In the 2017-2018 suspected case survey, 122 confirmed or probable human MPXV cases were reported in 17 states, including 7 deaths (6% case fatality rate). Contrary to the old reports that the patients were exclusively rural and living in forest areas, the current outbreak has spread to people living in urban areas [9]. Recently, different reports of MPXV detection in non-African and non-endemic countries are available [10]. Due to the unavailability of antiviral treatments for most viral infections, there is a need to take measures to overcome the prevalence of viral infections and epidemiological control; Such as identifying suspicious cases, expanding diagnostic tests with quick and correct answers, reducing the contact of suspicious cases with others, using high-performance personal protective equipment suitable for the type of viral infection, mass vaccination widely and globally [11]. Ignoring the increase of positive cases and spread in different countries can have consequences, as a result, it is better to take necessary measures with international cooperation to prevent the outbreak of this disease and to prevent the spread of the endemic geographical areas of the disease.

### Increased Incidence of Monkeypox after Years of Absence

Although it has been reported in the above-mentioned previous studies that the highest incidence of MPXV was seen in people under the age of 30, the most recent data also had the most reports of infected people aged 50 years or younger, and none of these people had a history of vaccination in The last smallpox vaccination program was in 1980. Contrary to previous years, when the transfer of laboratory animals from endemic areas to other countries caused the spread of the virus to other countries, recent data show that the reduction of immunity in the community due to the cessation of vaccination in 1980 could be one of the drivers of the spread of the virus in between different countries.

Increasing communication and facilitating travel between people of different countries, cultural and economic changes, and even climate changes can be among the reasons for the increase in the spread of viral infections such as MPX. Today, with the advancement of air vehicles and high-speed vehicles, a person can travel through several countries and cross many international borders before the symptoms of the disease appear if they are infected with a viral disease. With the experiences we have from the Coronavirus disease 2019 (COVID-19) pandemic, it seems that the expansion of research to achieve the fastest diagnoses and markers before the symptoms of the disease appear and the education of international travelers, especially travelers based in endemic areas, can help reduce the spread of infection to an acceptable extent. According to what we experienced in the COVID-19 pandemic, the detection of the virus in several countries, and other countries will undoubtedly not be safe from the spread of the virus. For this reason, international cooperation should be done before the alarm of the spread of MPXV around the world is sounded. In the face of infectious diseases, the world is likened to one country and different countries are like the provinces of one country. Therefore, international cooperation, such as cooperation in preparing a suitable vaccine, making diagnostic kits for all countries, and prioritizing African countries and endemic areas, can play an important role in controlling the disease.

### Learnings and Experiences of COVID-19 to Deal with Monkeypox

Skin lesions in MPXV are abundantly observed in the genital area [12]. During the COVID-19 pandemic, we observed that some patients for some reason hide their illness or throw down to embrace their illness. These issues are caused by cultural attitudes and even feelings of shame and modesty in society. In dealing with patients suspected of having MPXV, attention should also be paid to this point, especially that skin lesions, especially in the genital area, affect the appearance of the patient, and this may lead to refusal to accept the disease due to the above-mentioned social and cultural reasons. Spread the disease.

The use of diagnostic tests in controlling infections is well known. High accuracy and speed are important features of diagnostic kits. Detection methods based on genome and antigen detection are among the best options in choosing kits for virus detection [11]. The use of Real-Time PCR methods and rapid antigen detection cassettes is suggested as they were efficient in the COVID-19 pandemic. In addition to using appropriate kits, training employees for correct and safe sampling for the sampler, transferring samples, storing samples, and finally using experienced people are also important.

Even though several years have passed since the

first outbreak of the COVID-19 disease and today the importance of vaccination in reducing the spread of this disease is clear to everyone, there are still people who, in addition to not being vaccinated, have also run anti-vaccine campaigns [13]. This issue should be taken into account, if the vaccine is used to control MPXV, we will witness these issues again, and it is necessary for organizations related to health to be prepared by publishing scientific and logical materials to express the importance of vaccination. It seems that referring to the history of vaccination and pointing to the saving of millions of people's lives by vaccines like what Edward Jenner did would be useful in this matter.

## Summary

Studies and experiences have shown that zoonotic infections, especially zoonotic viral infections, have the ability to erupt and create a pandemic. MPXV has suddenly increased significantly after decades. This increase in the incidence of the disease, unlike in the past decades, which occurred in endemic areas, today has been in many different countries with a large geographical area and in different continents. Applying experiences from the COVID-19 pandemic and international cooperation between policymakers and medical and health science researchers can play an effective role in the excessive spread of MPXV. The use of effective vaccine, accurate and fast laboratory tests, and education of the general public about the symptoms of the disease and prevention methods can be effective before it spreads to the number of endemic areas and the alarm of the disease is sounded.

## Declarations

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Not applicable.

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The author declares that they have no Competing interests.

### Authors' contributions

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## References

1. Bauer D, St Vincent L, Kempe CH, Downie AW (1963) Prophylactic treatment of smallpox contacts with N-Methylisatin ( $\beta$ -Thiosemicarbazone (Compound 33T57, Marboran). *Lancet* 1963: 494-496.
2. Cho CT, Wenner HA (1973) Monkeypox virus. *Bacteriol Rev* 37: 1-18.
3. Ladnyj I, Ziegler P, Kima E (1972) A human infection caused by monkeypox virus in Basankusu Territory, Democratic Republic of the Congo. *Bull World Health Organ* 46: 593-597.
4. Marennikova S, Šeluhina EM, Mal'Ceva N, Čimiškjan K, Macevič G (1972) Isolation and properties of the causal agent of a new variola-like disease (monkeypox) in man. *Bull World Health Organ* 46: 599-611.
5. Senkevich TG, Yutin N, Wolf YI, Koonin EV, Moss B (2021) Ancient gene capture and recent gene loss shape the evolution of Orthopoxvirus-Host interaction genes. *Mbio* 12: e01495-e01521.
6. Rimoin AW, Mulembakani PM, Johnston SC, Lloyd Smith JO, Kitalu NK, et al. (2010) Major increase in human monkeypox incidence 30 years after smallpox vaccination campaigns cease in the Democratic Republic of Congo. *Proceedings of the National Academy of Sciences* 107: 16262-16277.
7. World Health Organization (2015) Health topics: Disease outbreaks. World Health Organization, Geneva, Switzerland.
8. Xiang Y, White A (2022) Monkeypox virus emerges from the shadow of its more infamous cousin: Family biology matters. *Emerg Microbes Infect* 11: 1768-1777.
9. Yinka-Ogunleye A, Aruna O, Dalhat M, Ogoina D, McCollum A, et al. (2019) Outbreak of human monkeypox in Nigeria in 2017-18: A clinical and epidemiological report. *Lancet Infect Dis* 19: 872-879.
10. Thornhill JP, Barkati S, Walmsley S, Rockstroh J, Antinori A, et al. (2022) Monkeypox virus infection in humans across 16 countries-April-June 2022. *N Engl J Med* 387: 679-691.
11. Cheng VC-C, Chan JF-W, Hung IF-N, Yuen K-Y (2017) Viral infections, an overview with a focus on prevention of transmission. *International Encyclopedia of Public Health* 2017: 368-377.
12. Patrocinio-Jesus R, Peruzzu F (2022) Monkeypox genital lesions. *N Engl J Med* 387: 66.
13. Cotfas L-A, Delcea C, Gherai R (2021) COVID-19 vaccine hesitancy in the month following the start of the vaccination process. *Int J Environ Res Public Health* 18: 10438.