



Pathophysiology on Monkeypox- A Review Paper

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ABSTRACT:

Monkey pox is a viral infectious disease caused by the monkey pox virus, which is closely related to the smallpox virus. The disease was first identified in monkeys in 1958 and symptoms include fever, headache, and muscle aches. One key difference between monkey pox and small pox is that monkey pox often causes lymphadenopathy (swelling of the lymph nodes) while small pox does not. Transmission of monkey pox can occur both from animals to humans and from human to human, primarily through respiratory droplets generated during close face-to-face contact. To prevent the spread of monkey pox, measures such as restrictions on animal trade and the quarantine of infected animals may be implemented. Currently, there is no specific treatment for monkey pox and no vaccine available for general use.

Keyword: Monkeypox, transmission, prevention

INTRODUCTION:

Monkeypox a viral zoonosis (viruses transmitted to humans from animals) with symptoms similar to the smallpox or chickenpox. which is clinically less severe. The Mpx (monkeypox) virus was first isolated and identified in 1959 when monkeys shipped from Singapore to a Denmark research facility fell ill.[1] However, the first confirmed human case was in 1970 when the virus was isolated from a child in the Democratic Republic of Congo suspected to have smallpox[2]

The Poxviridae family consists of nucleocytoplasmic viruses with large double-stranded deoxyribonucleic acid (DNA) measuring 200-400 nm. They can be detected by light and electron microscopy[3] Monkeypox virus is an Orthopoxvirus, a genus that includes camelpox, cowpox, vaccinia, and variola viruses. The virus is the foremost Orthopoxvirus affecting human populations since smallpox eradication, confirmed by the World Health Organization in 1980.[4] Monkeypox was first identified in Denmark in 1958, following an outbreak of pustular disease in a macaque colony [5]. The macaques had been imported from Singapore. The first human monkeypox case was identified in the Democratic Republic of Congo (DRC, then Zaire) in 1970 as the incidence of smallpox was decreasing [6], [7].

CURRENT STATUS ON MONKEYPOX:

Monkeypox cases have been confirmed in the Central African Republic, Sierra Leone, the Democratic Republic of the Congo, Liberia, Nigeria, and the Republic of the Congo in 2017. All nations, with the exception of Sierra, presented a brief assessment of the epidemiological condition. The main issues that endemic nations deal with are summarised here; some of them are global, while others are more country-specific.[8]

The elimination of smallpox was attributed to the restriction of person-to-person transmission without the need for socially challenging interventions related to sexually transmitted diseases, absence of air-borne transmission, a useful vaccine, and the absence of a viral host in animals. Immunization against smallpox among the general population was discontinued in 1980.[9] In the United States, the CDC identified an outbreak of monkeypox on May 17, 2022. By August 4, 2022, the Department of Health and Human Services declared the monkeypox outbreak a public health emergency.[10] Monkeypox is brought about by an orthopoxvirus, a type of DNA virus. It is a zoonotic viral infection that has been present in West Africa and Central Africa for over a decade. After an incubation period of between 4 and 21 days, the symptoms of monkeypox are similar to, but less severe than, those of smallpox and include fever, decreased lung function, skin rash, and skin blisters but without swollen lymph nodes. In people with a normal immune system, the symptoms reported in endemic areas in West Africa were mild, with rare cases of human-to-human transmission [11,12] It is still uncertain why the monkeypox virus is spreading rapidly to humans. One idea is that since the end of smallpox vaccinations worldwide in 1980, there is less population immunity, which has led to the emergence of monkeypox. This theory is supported by various important observations about the spread of disease [13]

ETIOLOGY:

Monkeypox is originated by Monkeypox virus, which belongs to the genus orthopoxvirus, and is also generated by a class of viruses that include chicken pox and small pox belonging to the same genus[14]. Poxviruses include all necessary replication and transcription in their genome. The source of the monkeypox virus is uncertain, but it is believed to come from squirrels or rats in central Africa. Research indicates that various animals, such as primates, bunnies, and rats, may serve as hosts for the virus. As the virus is found in animal populations, it is unlikely that it can be completely eradicated.

EPIDEMIOLOGY:

Monkeypox is a disease found in humans that was initially discovered in the Democratic Republic of the Congo, specifically in the town of Basankusu, back in 1970[15]. A subsequent unexpected outbreak of human sickness was identified in DRC/Zaire between 1996 and 1997. In 2003, there was a minor outbreak of human monkeypox in the United States among individuals who kept pet prairie dogs. In 2005, there was an outbreak of monkeypox in Unity, Sudan and isolated cases have been reported since then. In 2009, a campaign to reach out to refugees from the Democratic Republic of Congo into the Republic of Congo identified and confirmed two cases of monkeypox.

An outbreak of monkeypox occurred in the Central African Republic with 26 cases and two deaths between August and October 2016. Typically, the risk of contracting the disease is determined by factors such as exposure to the virus, the individual's immune response, underlying health conditions, vaccination status, and the severity of complications. Poxvirus infections do not discriminate based on ethnicity and the prevalence is similar in males and females. About one-third of the infections were found to be asymptomatic. The increase in cases was attributed to the civil war, which led to increased hunting of forest animals that carry monkeypox, particularly squirrels. As lifestyles improve due to urbanization and agricultural activities replace hunting and trapping, the likelihood of reducing monkeypox, both from the primary host and intermediate hosts, will decrease and it will become a rare disease.[16]

SIGNS & SYMPTOMS:

The initial indications and manifestations of monkeypox are usually general, with a viral fever preceding phase that is backache, tiredness, sluggishness, and a low-grade fever. Then 12-16 days after exposure, a blistering and pustular rash starts on the face and chest and then spreads to other body parts, including the palms of the hands and soles of the feet, in a radiating pattern.[17,18] The rash morphologically goes through stages, starting as flat, then raised, blister-like, and then pustular lesions.[19] Monkeypox is a disease that runs its course without medical intervention, with symptoms lasting for two to four weeks, and an incubation period of 8 days (ranging from 4-14 days)



PATHOPHYSIOLOGY:

Monkeypox is an infectious disease caused by the monkeypox virus, which is closely related to the smallpox virus. The disease primarily affects humans and nonhuman primates, such as monkeys, chimpanzees, and gorillas. The pathophysiology of monkeypox begins with the virus entering the body through broken skin or mucous membranes, where it replicates in the local lymph nodes and spreads to other parts of the body via the bloodstream [12].

The monkeypox virus can cause a severe, even fatal, illness in some individuals, particularly in people with weakened immune systems. The most serious complications include severe skin infection, pneumonia, brain inflammation, and bleeding[12,14].

There is no specific treatment for monkeypox infection and no licensed vaccine is available in most countries, but supportive care can help to relieve symptoms.

DIAGNOSIS:

Diagnostic methods are crucial tools in identifying an infection caused by an Orthopoxvirus, such as monkeypox. These tests, when used in conjunction with clinical and epidemiological information, including a patient's vaccination history, can provide a definitive diagnosis. Lesion exudate samples collected on a swab or crust specimens are considered some of the best and least invasive options for acute patient samples. The viral DNA present in

these samples can be stable for a long period of time if stored in a cool and dark environment, which is important to consider when proper storage facilities are not readily available. Other conventional techniques, such as viral isolation, electron microscopy, and immunohistochemistry, are also valid options but require specialized training and advanced laboratory facilities. Additionally, real-time polymerase chain reaction (PCR) can be used to detect the presence of Orthopoxvirus or monkeypox virus in a lesion sample [20,21]

TREATMENT:

Currently, there are no specific treatments or drugs that have been authorized for the treatment of human monkeypox. However, the smallpox vaccine, which has been used for centuries to prevent smallpox, may also provide protection against monkeypox. This is because the monkeypox virus is closely related to the smallpox virus. With the discontinuation of routine vaccination for smallpox in the 1980s, the general population has become increasingly susceptible to monkeypox virus infections. This highlights the importance of continued research and development of effective vaccines and treatments for monkeypox.

Tecovirimat (ST-246) is a drug that has been shown to be effective in treating illnesses caused by Orthopoxvirus. Studies in humans have demonstrated that the drug is safe and well-tolerated with minimal side effects.[22] Tecovirimat is currently undergoing clinical trials and has recently received approval from the U.S. Food and Drug Administration to proceed to Phase II trials. In the initial Phase I trials, tecovirimat was generally well-tolerated with no significant adverse events

Cidofovir is a potent antiviral drug that is used to treat a variety of viral skin conditions. It can be applied topically or directly into the lesion for the treatment of skin diseases caused by DNA viruses. Cidofovir has a wide range of activity against all DNA viruses, including Herpes, adeno, polyoma, papilloma, and poxviruses.[23] Studies have shown that it is effective against a variety of poxviruses, such as smallpox, cowpox, monkeypox, camelpox and molluscum contagiosum.

Vaccinia Immune Globulin (VIG) is a medication derived from the blood of individuals who have been vaccinated against smallpox. The blood is collected, pooled, and the antibodies generated in response to the vaccination are extracted and purified[24]

CONCLUSION:

The emergence of a new pox virus similar to smallpox has raised concerns about the potential spread of monkeypox, especially in light of increased global travel. While the prevalence of human illness from monkeypox is not fully understood, further studies are needed to better understand the factors involved in the transmission and spread of the virus. Additionally, there are still many unanswered questions about the virus itself, as well as its animal reservoirs. Improving our understanding of this zoonotic disease will aid in the development of effective prevention strategies and help to alleviate human illness.

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