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"Unmasking Mpox :A Review Of Its Transmission Pattern, Risk Factors And Prevention Strategies"

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Abstract:

Monkeypox (mpox) is a zoonotic disease belonging to the Orthopoxvirus genus, usually transmitted through physical contact, respiratory fluids, and contaminated objects. This disease has become a global focus of attention due to its increasing prevalence since 2022. It is difficult to completely eliminate. In the secondary stage, direct contact with the virus, respiratory diseases, and sometimes sexual intercourse through person-to-person transmission become the primary route. The main problems include poor protection, direct contact with infected people or equipment, and animal interactions such as hunting or feeding animals. Diagnosis is based on genetic, clinical, and immunologic factors, and treatment is limited to antiviral drugs such as tecovir, cidofovir, and immunoglobulin.

1.INTRODUCTION

Monkeypox virus is a zoonotic disease. It is a double-stranded DNA (dsDNA) virus from the orthopoxvirus (OPXV) gene of the family Poxviridae and subfamily Chordopoxvirinae. It shares 93.3% genomic similarity with Poxviridae and smallpox virus. MOXV was discovered in 9181. This led the World Health Organization (WHO) to declare this disease a Public Health Emergency of International Concern (PHEIC) on July 23, 2022. The second PHEIC was appointed two years after the COVID-19 Public Health Initiative (PHEIC). . This disease originates in some African countries and has spread to neighboring countries in the Americas, Europe and Asia, affecting more than 97,745 people as of April 30, 2024 [Photo: 1] (World Health Organization, 2024). In 1958, a laboratory in Denmark reported that an Asian redhead from Singapore developed blisters and blisters from the chip over most of her body. Later, mpox also affected other apes and many other animals such as anteaters, orangutans, gorillas, chimpanzees, chimpanzees and marmosets. On the other hand, non-human primates represent an unexpected host. [1-6]

2.TRANSMISSION OF MPOX

2.1Human-to-Animal Transmission of Mpox

The first case of MPOX transmission involved a dog that became infected through contact with its owner. This highlights the potential for MPOX to generate new strains, raising concerns for public health and wildlife management. Direct interactions between humans and animals, such as hunting, land clearing, and animal scavenging, have been identified as significant risk factors for the spread of MPOX. Similar zoonotic transmission patterns have been observed in previous outbreaks such as COVID-19 and H1N1, highlighting the importance of understanding these changes. Many species have been found to be infected with MPOX, including rodents such as prairie dogs and groundhogs, as well as livestock. This interaction opens up the possibility of repeated zoonosis, where humans transmit the virus back to animals, creating a feedback loop for disease transmission. Genome sequencing has shown that infected dogs have the same type of disease as their owners, and that the dogs exhibit symptoms similar to MPOX. Certain groups of people, including asymptomatic people and children, are thought to be at higher risk of spreading the disease to pets and other animals. However, the risk of human-to-animal transmission is now very high, making it difficult to control the spread of the outbreak.

2.2 Human-human transmission

The standard model for human transmission is
(a) direct contact with contaminated objects/surfaces or mucocutaneous lesions of patients.
(b) respiratory fluids spread during face-to-face contact or through bedding,
(c) sexual transmission
(d) vertical transmission. animal-to-human transmission (72.5%) compared to human-to-human (27.5%). Over time, human-to-human transmission (78%) has become a more common surprise.

2.3 Animal-animal transmission

The virus can be found in animals within the scabs, crusts, fluids of the rash site, and in the infected body fluids (respiratory secretions, urine, feces, and semen). Trans mission from one animal to another can occur through direct lose contact with respiratory droplets, contaminated animal environment (organic matter containing virus particles), and skin/eye abrasions. Another possible transmission route is ingesting infected animal tissue by non-human primates. Notably, not all infected animals develop lesions and characteristic symptoms of the disease.[7-14]

3. RISK FACTORS

Table 1: - mpox risk factor[15-16]

RISK FACTORS	DESCRIPTON OF RISK
Close Physical Contact	Direct, prolonged skin-to-skin contact with an infected person can transmit the virus.
Exposure to respiratory function.	Being close to respiratory droplets from coughing or sneezing by an infected person.
Contact with Contaminated Materials	Using items such as bedding, towels, or clothing that have been used by an infected person.
Compromised Immune System.	Individuals with weaker immune systems may have a higher susceptibility to the virus. A higher risk of severe mpox symptoms and fatality occurs in individuals with advanced Human Immunodeficiency Virus (HIV) who have mpox
Animal Transmission.	Contact with infected, animals, includes bites.
Sexual contact	Transmission can occur through sexual activities, especially where there are lesions.
Travel to Endemic Regions	Risk to healthcare workers or patients from contact with infected individuals

4. DIAGNOSIS

To detect the virus, doctors need to collect appropriate samples and carefully send them to a certified laboratory. Diagnosis of human MPX infection is based on samples and can be done in the laboratory. Because the symptoms of the disease are difficult to recognize and reduce in low-income countries. These areas are considered diseased, causing international competition. Confirmatory methods used to identify samples and measure MPX include genetic, phenotypic and immunological methods. The temperature test used for diagnosis is polymerase chain reaction (PCR). In addition to high accuracy and sensitivity, bacterial DNA in the wound can persist for a long time if stored in a dark and cool place. Because PCR monitoring center requires good laboratories, which are difficult to find in countries with limited resources. Future technologies can improve PCR and qPCR to overcome their consequences and can be used outside of large laboratories, making accurate diagnostic tools available to all medical personnel, even people in poor countries. Antibody testing should be done to establish the basis of the disease. Antibodies to orthopoxviruses cross-react with other orthopoxviruses. However, these tests may be useful when previous symptoms are present that explain the cause of the disease. Although IgG alone cannot provide a definitive diagnosis for patients with persistent orthopoxviruses through vaccination, IgM is thought to be more effective in retrospective analysis for new patients [17–23].

5. SYMPTOMS

Table :4. Symptom s/Complications and Potential Supportive Treatment.

Symptoms/Complications	Supportive Treatment
Respiratory distress / bronchopneumonia	Oral/intravenous antibiotics for prophylaxis, nebulizers treatment, noninvasive ventilation (ex. CPAP)
Sepsis	Oral/intravenous antibiotics, supplemental oxygen, corticosteroid, insulin.
Gastrointestinal/mouth and throat ulcers	Oral/intravenous antiemetic and antidiarrheal Medications, oral/intravenousrehydration
Fever	Antipyretic medication, external cooling
Inflammation/lymphadenopathy	Oral/intravenous Anti-inflammatory/analgesic medications
Corneal infection	Ophthalmic antibiotic, antiviral, corticosteroids
Skin scarring/Cellulitis/Skin lesions	Application od moist occlusive dressings to promote re-epithelization

6. PREVENTION

Prevention of MPOX requires targeted measures for healthcare providers and individuals. It is important for doctors and nurses to avoid direct contact with infected skin or products of MPOX patients. It is important to use personal protective equipment (PPE), including overalls, gloves, goggles, and a good N95 mask, when treating someone with urticaria. Patients who are injured or diagnosed with MPOX should immediately wear a mask covering their skin and be isolated in a room. Gloves should also always be worn when handling the patient's clothing to prevent contamination. Avoid sexual intercourse or sexual contact with infected individuals. Good hygiene, such as frequent hand washing, breathing, and cleaning surfaces after visitors, are important preventive measures. Safe sex, including using condoms and limiting sexual partners, can further reduce the risk. The smallpox vaccine provides up to 85% protection against the flu. There are currently two vaccines available: ACAM2000® (a mild vaccine) and JYNNEOSTM (a modified barrier vaccine approved by the FDA). Together, these measures help control MPOX and prevent its spread. People with MPOX should contact their doctor for guidance and, if possible, isolate themselves in a well-ventilated room at home. It is important to wash your hands regularly with soap and water or use hand sanitizer, especially before and after contact. Wearing a mask around others and covering the affected area can help reduce the risk of transmission, as it can dry out and expose the skin unless the same room is shared. Other self-care options include gargling with salt water for mouth sores, taking warm baths with baking soda or Epsom salts for sores, and taking over-the-counter pain relievers such as acetaminophen or ibuprofen. People should avoid picking or scratching the blisters, as this can slow down the healing process, spread the rash to other parts of the body, or cause infection. You should not shave the affected areas until the rash has healed and new skin has formed. Covering the affected areas and wearing a good mask when near others can reduce further transmission. Using a condom during sex reduces the risk, but does not prevent skin-to-skin or mouth-to-mouth transmission. It is recommended to use condoms for up to 12 weeks (about 3 months) after healing and to avoid sex with new partners during the contagious period. People who have been infected with MPOX should monitor for symptoms for 21 days (3 weeks) and avoid sexual intercourse during this time as a precaution.), wear protective clothing, eyewear, and a respirator. They should also take safety precautions when swabbing wounds for medical testing or handling sharp objects such as needles. By following these self-care and self-protection guidelines, individuals and healthcare professionals can effectively manage symptoms and reduce the transmission of MPOX..[24-29]

7. DRUG USED FOR MPOX

7.1 Cidofovir

Cidofovir was approved by the FDA in 1996 for the treatment of cytomegalovirus (CMV) retinitis in patients with acquired immunodeficiency virus (AIDS). It has demonstrated broad-spectrum antiviral activity against several familial viruses, including herpesviruses, adenoviruses, and orthopoxviruses (OPXV). Cidofovir was used to treat OPXV infection in a 28-month-old boy who developed refractory atopic dermatitis and severe immunosuppression after exposure to his recently vaccinated father. The boy survived without long-term complications.

7.2 Brincidofovir

Brinsidofovir was approved by the FDA in June 2021 to treat smallpox. Data suggest its use in difficult cases, such as a patient with acute myeloid leukemia (AML) who developed positive antibodies after smallpox vaccination and received 6 doses of the vaccine as part of a combination therapy. It has also been used to treat a 17-year-old kidney transplant patient with a fatal bacterial infection. In May 2022, Adler et al. reported three patients in the UK treated with brinsidofovir who developed elevated enzymes with known side effects and did not require further treatment.

7.3 Tecovirimat

Tecovirimat was approved by the FDA in 2018 for the treatment of minor infections and by the European Medicines Agency in 2022 for the treatment of infections and diseases. It has been used in many cases of cowpox and other diseases, including infections and eye diseases. Tecovirimat is also used prophylactically in AML patients aged 19 years and older who were vaccinated 61 days after smallpox vaccination to prevent the development of antibodies during chemotherapy, for example. In another case, it was used to treat a worker diagnosed with a needlestick infection. Tecovirimat has been shown to be effective in treating measles; Additionally, tecovirimat was made available to the Central African Republic in 2021 as an approved entry for the treatment .

7.4 Vaccinia Immune Globulin Intravenous (VIGIV)

The FDA approved intravenous (VIGIV) vaccine in 2005 for the treatment of vaccination-related complications. Historically, immunoglobulin has been administered by intramuscular injection, and its use is well documented. VIGIV has been used to treat various types of OPXV, including anti-rabies glycoprotein recombinant virus in patients with gastrointestinal disease and antibody-mediated viral infection symptoms in individuals who have received smallpox vaccine.

In smallpox (MPXV), most infections are mild to moderate and self-limiting. However, antibiotic therapy is recommended for severe infections requiring hospitalization, involvement of the eye, mouth, or perineum, or in high-risk groups such as immunocompromised patients, children, and pregnant or lactating patients.

8. CONCLUSION

This review of Mpox (monkeypox) provides a better understanding of the disease, including its transmission, risk factors and prevention strategies. It demonstrates the zoonotic nature of MPOX, which is transmitted through contact with animals or humans and through respiratory droplets. The main risks include direct physical contact, exposure to contaminated products, protective equipment and certain human activities such as hunting or herding animals. Prevention.
supports the importance of vaccination, safe practices and isolation of infected persons to prevent the spread of the disease.
Diagnosis is based on clinical, genetic and immunological factors, while treatment stops the spread of the disease. Antiviral drugs such as Cidodovir, Brincidofovir, Tecovirimat, Vaccinia Immune Globulin Intravenous (VIGIV). The public health strategy emphasizes early diagnosis, vaccination and international cooperation to control the epidemic. Lack of confidence in animal reservoirs is difficult to exploit, but greater knowledge and preventive measures may reduce the spread of mpoX. [30,31]

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